

THE EASTERN CHRONICLE
PICTOU

DEC. 6, 1849

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September 1871.

also created a healthy stimulus to action. Further, he maintained that they were valuable in the advancement of agriculture itself, in the improvement of stock, and above all—and this applied more to arable districts—in the wonderful improvements they had seen within the last few years in the mechanics of the farm. (Applause.) They were told by men of the old school that 20 or 30 years ago animals were quite as good as they were now. As he could not deny that he supposed he must grant it. But suppose that was the case, nobody would deny that the average stock throughout the country now was a vast improvement on what it used to be. As far as Cheshire dairy stock was concerned, he thought nothing could speak more highly in favour of the Cheshire farmers than the fact that within little more than four years the Cheshire farmer had been able to bring back his herd to almost the same state of excellence in which it was before the great scourge of 1866. That fact showed an amount of energy and enterprise amongst those who were struggling with difficulties to get back the best stock they could make the Cheshire dairies what they originally were. (Applause.) He had read a letter from Mr. Mechi, the eminent agriculturist, in the *Times* of the previous day, and he agreed with a good deal of what that gentleman said. The writer said we put a large sum annually into the pockets of foreigners for corn, and asked what were the causes of it? "The causes of this unprofitable state of things," Mr. Mechi said, "were obvious and remediable. It is our attachment to the old pastoral age when the acres were many and the population few. One-half of the United Kingdom was occupied by permanent pasture, much of it exhausted, weedy, and naturally, most unprofitable; deprived of the benefits arising from cultivation, and yielding a *minimum* of produce and employing a *minimum* of labour and capital." Taking the country through he had no doubt Mr. Mechi was right, and that if a great deal that was now in grass were in corn there would be a great deal more corn grown for the home market, and consequently less necessity for large importations of corn. (Hear, hear.) He did not think, however, that was the case with Cheshire—the remarks did not apply to their green verdant pasture—their fine well-boned grass. He did not think they could lay down any universal rule for farming. (Applause.) He was a Scottish landlord, and had a good many tenants on 19 and 21 years' leases. They were bound by clauses in the leases to follow a certain rotation of crop. But though he had such leases, he confessed he could go so far as to say a man was not fitted to be an agriculturist if he could not be trusted with the crop of his own farm. (Loud cheers.) He thought they could lay down no universal law for farming in England, so much depended upon the variety of climate and other contingencies. His opinion was that so long as the Cheshire farmer could obtain a fair remunerative price for his cheese—so long as he could maintain some 20s. or 25s. between the price of the best Cheshire and the best American cheese, he had nothing to fear from American competition. (Applause.) He thought it would be found that the dairy system of Cheshire was as well adapted to it as any other that anybody could suggest. (Applause.)

Sir P. Egerton, M.P., then proposed the health of "The President" in flattering terms. The toast was received with loud applause. The CHAIRMAN, in responding, expressed his obligations for the flattering manner in which his name had been received, and also expressed a hope that he would himself become an exhibitor at the show and take off a first prize, a feat of which he would feel proud. Mr. W. R. COURT proposed the health of the "Vice Presidents," coupled with the name of Mr. Aston. Mr. Aston returned thanks, commenting on the success of the show of that day, and of the interest manifested in the show by the public, as evidenced by the large numbers present. Referring to the question of improvements of the soil and increasing the produce derivable from land, he said he would propose for their consideration the following:—First, that all waste land should be reclaimed and cultivated that would pay for the outlay; second, that all injurious and unnecessary timbers and hedge-grows be grubbed up; third, that all unwood and wet land be efficiently drained; fourth, that but a small portion of manure be applied for tillage purpose, and that the bulk be spread on the grain seed—(no, no); fifth, that all roots and serial crops, as much as possible, be grown from old turf soils; sixth, that the occupier of land be allowed to kill ground game—(hear, hear, and laughter); and seventh, that the tenant on leaving his farm be recompensed for all permanent improvements. (Hear, hear, and applause.) Mr. S. LEVYER proposed "The Judges," to which Mr. Hopkins and Mr. Lowe responded, the former saying that he had been at the Darporley show for several years, and believed that the present was the best he had ever seen there; while the latter praised the show of young stock in the class for horses, especially the colts. Mr. CAVIERY gave "The Successful Candidates," to which Mr. Fitton and Mr. Barnett briefly responded. Mr. J. VERNON proposed "The Unsuccessful Candidates," which was responded to by Mr. Oulton. Mr. FINCHERY then gave "The Health of Mrs. Done" who had kindly lent them the use of the ground on which the show had been held. Mr. DONEY, Junr. responded, stating that it gave his mother much pleasure to have been able to be of service to the society. Mr. DAINE then gave "The Secretary," of whose service he spoke highly. Mr. W. VERNON, in responding, stated that the society since its establishment in 1863, had been successful from the commencement, both financially and in the number and quality of stock exhibited. The receipts from their first show was about £20, while the receipts from the present show reached in round numbers £60. He had been connected with the society from the beginning, and was very glad to be of any assistance to it. (Applause.)

The remaining toasts were "The Strangers," "Prosperity to the Town of Darporley," and "The Cheshire Dairymaids," after which the company separated, having spent a most agreeable evening. **MR. MACKINTOSH'S LECTURE ON BOULDER-CLAY & GRAVEL, AND THE ANTIQUITY OF MAN.** Last Saturday and Monday evenings Mr. Mackintosh delivered the fifth lecture of his course, on Saperdical or Post-tertiary Accumulations, to large and appreciative audiences, several of whom attended both the lecture and its repetition. On Saturday he considered the events of the Glacial and Post-glacial periods retrospectively—on Monday successively. On the latter evening he began by giving a description of the great chinked dish called Greenland, over the borders of which ice is continually boiling into the sea. This he illustrated by a heap of sand and a quantity of salt. He believed that the Lake District and Wales may at first have been covered with a valley-ignoring ice-sheet, which, as the surrounding sea encroached, may have sent off ice-bergs. But as a great part of the northern drift of Cheshire and Lancashire must have been dropped into a sea, not sufficiently deep to float ice-bergs, and as it must have radiated irrespectively of the direction of valleys, he was convinced that belts of coast-ice, first freezing round beach-singles and boulders, then receiving others from subaqueous cliffs, and, finally, marching off with cargoes of drift, and dropping it as the ice grounded or melted—that ice in this form was the main cause of the transportation of boulders, many of which were not only scattered over the plain of Cheshire, but carried as far as Wolvehampton, or a distance of more than 150 miles! The lecturer then minutely described the fine section of boulder-clay near Thurstaston, beyond Park-gate, gave the percentage of different rocks it contained, and exhibited specimens on the table of the principal rocks found in the boulder-clay of Cheshire. He was now of opinion, contrary to the first impression he had received, that the mass of the low-level boulder-clay of Cheshire was Lower Boulder-clay—that it ran under 150 feet of middle sand and gravel near Gresford, above which he, in company with Mr. W. Shone, junr., found considerable patches of upper boulder-clay filling up hollows. After describing the three great granitic divisions, he went on to systematize the sequence of events after the rise of the land out of the upper boulder-clay sea—the most difficult and complicated subject connected with geology. He believed with Mr. De Ranee, of the Geological Survey, that the Shindley hill sand, which crops out near Southport, represented the so-called raised benches of Great Britain. When it was deposited the land must have sunk considerably lower than at present. During this submergence the valleys of the south of England, and the caves of South and North Wales, must have been at least partly filled up with drift by the sea. Some valleys may have been alternately excavated and filled up by the streams which now traverse them, supposing their inner ends to have experienced a corresponding upheaval and depression so as to accelerate and diminish the velocity of the stream. But while many considerations render it probable that this could only have exceptionally occurred, and as good sections of valley-gravels have indicated the complete, or nearly complete excavation of the valleys before the extensive and continuous coverings of drift were deposited, it is more in accordance with the present state of inquiry to suppose that the present streams have merely washed away the drift down to a certain level, occasionally leaving terraces on one or both sides of the valley. The Somme valley in France has lately been thoroughly surveyed, and the sections on which the high and low level, or old and new gravel theory was founded have been shown to be mythical.—In other words, the gravels of the Somme valley have been found to be all one sheet of drift which the stream has been gradually terracing down during a period which need not be regarded as longer than a very few thousand years. The flint implements found in this gravel need not therefore be referred to a very remote antiquity. The 30 feet of peat at the mouth of the Somme valley may have mainly accumulated on

ground considerably depressed beneath the level of the sea, the latter being dammed back by natural barriers, as we now find on many coasts, and thus the doctrine of a long period during which the land subsided after the accumulation of the peat may be dispensed with. The lecturer then combated the theory of the very remote antiquity of flint-tools found in caves, founded on the assumption that the caves must have been filled up by the neighbouring runlets before these runlets excavated the valleys they now traverse, and endeavoured to prove that the valley under Korri's Cavern, near Torquay, must have existed long before the infilling of the cavern, and was never excavated by a fresh-water stream, but by currents of the sea. The lecturer, in conclusion, described the conditions under which the Cyclas-clay, which runs under a great part of the Irish Sea, was deposited—explained the indications of the Irish Sea having been dry land during this period—showed that Britons must have planted forests on this clay—that peat, a great part of which is now buried or submerged, must have accumulated on this clay—that sand must have been blown over the peat near the sea coast—and that last of all, the whole of the glacial, post-glacial, and recent deposits (including the blown sand) must have been deposited upon by the sea, as may be now witnessed on the west coast of Lancashire. The lecturer made a few concluding remarks on the extent to which the glacial period formed an episode in the geological history of the world.

FATAL FIGHT AT THE

The Quigley died on the previous Wednesday Court, and was committed to the custody of Anderson placed in the New Orleans Court, who said New Orleans David, three of "David, of beer, with him from the he and to to quarre She did i she had e David said: I k years of a o'clock, I went int Hotel, an standing ance to p also came did not r the way a threatening however, went into but came He still Rogers's he would and he n want to i in the mi ceased it A man n helped Q down. I Quigley a unconscious reply to a drunken n Joseph J said—I k last I saw house man (They beg off their e standing o he did not men had t most. Af up, when I coat on hi went part I left him I felt him seriously I Isabella Chester-rc saw the Deceased soner said (The man have done and three said if he in, and t also attem latter gra wards said The man tressed, w theman w Trimmer found Qu later—hal difficulty. Police-0 skated that he went at where Quig sleep, and deceased. Dr. Dow of the body on Friday? Birkenhead face. The died at five scalp I fon and the sk was found skull. The the tempo hemisphere blood. The disease account for by the fract the bone. this fracture fall. The Coro to be a paral week (that c made a few r unless these recurring th not think th diction wou Quigley. It that Rogers had no right that he had I field after th the jury that the skull ear of a blow fro it would be death. The fact of a per hly-past ty and. But as soon as U remarks ab for supplyi when they c thinking sh distinctly th into her ho by the polie licence shou the third off before him l and the cot numbers, an the commu The jury against Jam Coroner for morning. THE BI meeting of Hospi, bel Ayton, M.P. of magis of rates, no l of be left em

Printed and Published by "The Chester (North), in Chester.—SA

W Bell Dawson 10¢ 7

Daily Star

DAILY STAR:	45,620
Last Week's Average	
WEEKLY STAR:	87,495
Last Week's Issue...	
Average Circulation of the Star.....	133,115

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AUGUST 23, 1897.

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Itches, Aches, Old Sores,
Ring! Write COOK
Erasoric Temple.
List of cures. Capt.
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to book free.

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1897.
RES, 203 Ropery St.

PETER ADELSTEIN - That on
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court to make Isaac Goldstein trans-
fer of his business to Peter Adelstein.
1961

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And in Consequence some Shortsighted Dealers are offering as Substitutes Inferior Brands, Affording them Larger Profits.

Enormously the Largest Sale of Any Cigar in Canada:

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LATE NEWS FROM DYE A.

**An Avaricious Speculator Given
Short Shrift.**

**ENCOURAGING REPORTS STILL
RECEIVED FROM KLONDIKE.**

**The Founder of Dawson City on a
Visit to Ottawa.**

Vancouver, B. C., August 23d — The steamer Coquitlam returned from Dyea and Skagway to-day. She brings word of a rumor that a man was hanged near Dyea for theft without trial, though the officials of the vessel state that this is not correct. A man has, however, been banished from Skagway by the prospectors for attempting to collect a toll of fifty cents for each person crossing a tree which she had felled across the creek on the trail. He was given twelve hours to get out.

When the Coquitlam left there were at least 2000 to 3000 people camped at Skagway, and from 500 to 600 at Dyea. The Dyea trail is in very bad shape, but the United States

of registrar of the Supreme Court of the North-West Territories in the Yukon rendered vacant by the resignation of Lieut.-Col. Hon. Henry Aylmer. He will accompany Commissioner Walsh westwards next month.

** ** *

WILLIAM OGILVIE.

While all about him on the Klondike miners are securing fortunes, Mr. William Ogilvie, the Canadian surveyor whose reports on the district furnish almost the only authentic information concerning the Yukon, is quietly preserving order, settling disputes as to claims and boundaries and making himself of inestimable service to the Government of which he is an employe, and on the salary of a surveyor. He has not located a single claim for himself.

There are men who work for glory, there are men who work for gold,

There are men the love of women will spur on;

They will brave the tropic's fervor, they will face the Arctic cold,

They will toil till health and heart and soul be gone.

But the fate of man is labor; and the world is full of such;

And they fall and die about us, like ripe fruit.

Earth forgets that ever desert was awakened by their touch,

As she strikes up years, like sparks, in life's pursuit.

There are men who work for duty, and who do it, day and night,

These are men the world looks up to, and reveres;

And as through eternal silences it sweeps in headlong flight

It remembers where their graves lie, and with tears.

Where, from mighty peak and canyon, like a stealthy shape of death,

The Arctic night creeps down and o'er the

consin; J. D. Clarke, of Dayton, High Chief Ranger of Ohio; Hon. Judge Wedderburn, of New Brunswick, Supreme Councillor.

NOT JAY GOULD'S WIFE.

**Mrs. Angell Denies That She Was
Ever Married to Him.**

New York, August 23.—Mrs. Sarah Anne Brown Angell, who about two years ago came to the front as the first wife of Jay Gould, and whom she claimed had deserted her, has confessed, according to the New York Herald, that she never married Jay Gould, and only saw him but once or twice. She claims that George J. Gould knows how the mistake occurred that named her as his father's wife. The Herald says that Mrs. Angell has been the cat's-paw of a gigantic scheme by which a party of lawyers and a female detective sought to reap a harvest of gold, while she received but a small share.

TORONTO EXHIBITION.

The proposed reproduction of a portion of the Queen's Great Diamond Jubilee Procession in London, with ceremonies in front of St. Paul's Cathedral, and immense tableaux of incidents during the Queen's Reign, at the Toronto Exhibition from the 30th of August to 11th Sept., is creating much interest throughout Canada and the States, and thousands will go to Toronto to see it from all parts. All the uniforms, costumes, carriages, and state harness is being brought from England, and the actual decorations used in London. The attractions at the Toronto Fair this year

SITUATIONS

WANTED—IMMEDIATE
servant, also a first
References required. Ap
mount.

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quired. Apply to

WANTED—A GENERAL
of two. Must be a
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WANTED—A WELL
good address to ass
Association, at Victoria R
office.

WANTED—COMPETENT
general blacksmith
between 10 and 12, to The La
Catherine st.

WANTED—GIRL AB
light housework; re
ed. Address "J 2106," S

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want; references re
erine st.

WANTED—A GOOD G
references. Apply

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typewriter (young la
Address "J 2393," STAR OF

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\$3.00 a week, one sp
dress "J 2336," STAR OFFICE.

WANTED—RELIEF
man, one with a th
Box 104, St. Johns, P. Q.

WANTED—YOUNG W
tion to learn the pro
information apply to Home
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WANTED—FIFTY G
twenty-two years, to
afternoon or at seven to-mo
J. W. Windsor, Canal Bank

WANTED—GENERAL
family. Must be goo

WANTED—A MALE

LAST
EDITION.

The Montreal

VOL XXIX--No. 196.

MONTREAL, MONDAY, A

RELIGION AND SCIENCE.

British Professors Prove That They
Are Compatible.

CONSUMPTIVE SANITARIUM IN
MUSKOKA OPENED.

Sir William Dawson on the Rela-
tions of Science and Religion.

Toronto, August 23.—The British Association went holidaying on Saturday. Only one section met. The principal paper in that section, the geological, was that of Mr. J. C. K. Lefroy, of Le-

ferences between the two and said that the whole difficulty lay in the fact that the latter knew nothing about science and that the scientists knew little about the evidences and proofs of Christianity. It was easier to discover the truths in these two departments than to reconcile the finding of both.

Prayers were delivered by Rev. Dr. Thomas, of Sarnia, and others, and the meeting closed by Chancellor Wallace pronouncing the benediction.

Special services were held yesterday at St. Michael's Cathedral, St. James' Cathedral, and the Metropolitan Methodist Church as well as the University Gymnasium, many pulpits being filled by members of the British Association. The pulpit of St. James Square Presbyterian Church was occupied in the morning by Rev. Dr. Patten, president of Princeton University, who presented a scholarly argument in justification of the proposition that belief in God is the basis of all scientific evidence. Many members of the British Association attended.

** ** *

THE MUSKOKA SANITARIUM.

Gravenhurst, Ont., August 23.—Nearly a thousand people witnessed the ceremony of the formal opening of the Muskoka Sanitarium.

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DAYLIGHT.

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Be Without Daylight for Busi-
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Ulcers in Mouth, Hair
REMEDY CO., 3
Chicago, Ill., for
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I will not pay or hold
for any debts hereafte
wife, Dame Elizabeth
cause whatsoever, and
nishing her with good
soever on credit does
Montreal, Aug. 20th
196 4 JOHN M

NOTICE FROM PETER
the 17th day of Septem
Provincial Treasurer to author
fer his shop license to said pet
Montreal, 21st August, 1897



MONDAY, AUGUST 23, 1897.

NS VACANT.

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class nurse for two children,
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196 2

GOOD REFERENCES RE-
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AL SERVANT FOR FAMILY
good plain cook. References
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at exhibit of British Science
nk. Address "J 2404," STAR
196 1

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g. & Prov. Co. 839 St.
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5 YEARS OLD FOR
grove. State wages requir-
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AS GENERAL SER-
prof. Apply 2303 St. Cath-
196 2

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rescent st. 196 1

COOK FOR A STEAMSHIP
22 and 23 St. Ann's Market.
196 1

Y STENOGRAPHER AND
ly speaking both languages.
196 1

LADY STENOGRAPHER.
aking French preferred. Ad-
196 1

GENERAL PURPOSE
is preferred. Address F. O.
196 1

OMEN OF GOOD EDUCA-
cession of nursing. For further
Training School, 372 Pine st.,
196 6 3 aw

20 GIRLS, EIGHTEEN TO
work at fruit. Apply this
Pt. St. Charles. 196 1

SERVANT FOR SMALL
cook. 77a Cherrier st.
196 1

ACHER (PROTESTANT).

SITUATIONS WANTED.

WANTED—BY COMPETENT AND RELIABLE
man situation as night watchman, caretaker,
porter or any situation of trust. Best of references. 10
years with last firm. Address "D 1597," STAR office.
192 6

WANTED — SITUATION BY A THOROUGHLY
practical milliner, with city and country experi-
ence, competent to take full charge of millinery depart-
ment. Best of references. Apply or address "Milliner,"
886 Dorchester st. 192 7

WANTED—BY WIDOW LADY, AGE 30, SITU-
ation as housekeeper to widower or bachelor; city or
country. Highest references. Address K. R., Coalbrook,
Que. 194 4

WANTED—AN EXPERIENCED TEACHER OF
French, a Parisian (5 years in Montreal) would
make arrangements to teach French in a school or to give
a course of literature. Address "O 1834," STAR office.
194 3

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by a chartered accountant. Terms moderate. Address
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steady married man, experienced gardener, wife
thoroughly understands dairy work. Eight years refer-
ences. Address John Livingston, Post Office, Brockville,
Ont. 194 6

WANTED—BY MARRIED COUPLE WITHOUT
children, situation, man as coachman, good experi-
enced driver, served in cavalry regt.; wife as cook. Best
of city references. Town or country. Address "Q 1947,"
STAR office. 194 3

WANTED — BY AN EXPERIENCED MIDDLE
aged woman, a position as housekeeper or matron
in small family. Best of references furnished on applica-
tion. Address "S 2016," STAR office. 194 4

WANTED—A SITUATION AS CHAMBERMAID
and helping dining room in country hotel. Excellent
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195 2

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ment by lady (housekeeper, caretaker) of vacant
house in return for rooms. "P 1925," STAR office. 195 2

WANTED—POSITION AS CLERK OR BOOK-
keeper by young man aged 24, of good address.
Moderate salary, good references. Could give security or
invest money if suitable. Address Box 86, P. O. 195 2

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junior in wholesale business, aged 16, graduate of
college, respectably connected and living with parents.

ROOMS TO LET

ROOM—ONE PARLOR BEDROOM, WELL FUR-
nished, suitable for two gentlemen. Breakfast if
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ROOMS—COMFORTABLE FURNISHED SINGLE
rooms, with board. 260 St. Antoine. 195 2

ROOMS—TWO WELL FURNISHED ROOMS, ON
bathroom flat, with all modern conveniences. Fam-
ily private. 108 Union avenue. 195 15

ROOMS—MAGNIFICENT ROOM, FURNISHED,
with water and clothes closet in room; private family;
use of kitchen if desired. Price moderate, 1550 Ontario,
195 2

ROOMS—LARGE ROOM WITH GRATE, FUR-
nished as bed and sitting room, one single on bath-
room flat, without board. 30a City Councilors st. 195 9

ROOMS—ELEGANTLY FURNISHED PARLOR,
en suite, suitable for two gentlemen, also large front
bedroom, all modern conveniences, with best attendance.
Bath same flat. 132 Cathedral. 195 2

ROOM—A NICE FRONT ROOM WITH MANTEL
bed. Address 10 Balmoral st., city. 195 2

ROOMS—FURNISHED, WITH OR WITHOUT
board; all modern conveniences. 2074 St. Catherine,
few doors east of Bleury st. 195 3

ROOMS—FURNISHED ROOMS, 144 ST. LUKE ST.,
partial board if required. Private family, no chil-
dren. 195 2

ROOMS — FURNISHED OR PARTLY, FOR MAR-
ried couple or gentlemen; very central. Apply 2142
St. Catherine. 195 2

ROOMS — TWO LARGE WELL FURNISHED
rooms, on first flat, with or without board; use of
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ROOMS — DOUBLE AND SINGLE, WELL FUR-
nished, suitable for young gentlemen or married
couple, with board; every convenience. 774 Palace. 195 2

ROOMS—TWO LARGE WELL FURNISHED
front rooms, wardrobes attached, back parlor, small
room attached; every convenience. 166 Mansfield st.
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room flat; private family at 259 Bleury st. Moderate
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month. 2253 St. Catherine st. 181 20

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PERSONAL — BOSTON DENTAL PARLORS, 1834
Notre Dame st., Montreal. Beautiful Sets of Teeth
for Ten Dollars, fit and quality guaranteed. Painless ex-
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house, containing nine rooms,
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TO LET—32 VISITATION ST.,
beautiful tenement, eight rooms,
bath and w. c., lately grained and re-
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TO LET—LOWER TENEMENT, 32
Gullbault street; furnace, all mod-
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Bleury street. 195 6

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accommodations, very cheap. Apply
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TO LET — WELL FURNISHED
lower tenement on Bishop street,
from now till April next or longer. Ad-
dress "G 1694," Star Office. 195 2

TO LET—FULLY FURNISHED, NICE
6 roomed house, 235 St. Urbain street,
\$23, no taxes. Apply to Mr. Bonham, F. Temple

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...With this Generation of Men."

It Will Work Wonders

A Startling Advance in Medical Science is Fully Explained in a Little Book called "Complete Manhood and How to Attain It."

An earnest man who had suffered, hesitated, then put it to the test, writes thus:

"Well, I tell you that first day is one I'll never forget. I just bubbled with joy. I wanted to hug everybody and shake hands with all the world. My old self had died yesterday and my new self was born today. Why do you tell me when I first wrote that I would find it this way? You tell me when I first saw the light."

The man was not made whole by magic in a day—but in a little while—he "saw the light" before he had finished the first chapter.

Every man who would know the grand truth, the plain facts, the new discoveries of medical science—who would secure this simple, logical and avoid future pitfalls, should buy "Complete Manhood and How to Attain It."

By simple "curiosity seekers," to those whose physical condition is perfect—to those who need no aid—to those who are weak, nervous, and suffering from all kinds of ailments, we say emphatically this book is *useless and uninteresting*. It is purely medical and scientific, published to make known a system of treatment of incalculable value to *men who need it*.

If you are looking for something sentimental, frivolous, improper, don't waste your time and ours by writing. This is no place for such things.

If you want advice, wisdom, warning, help, noble manhood—if you want to escape snafus, traps, quackery—get this book now.

Write to the Eric Medical Co., 64 Niagara St., Buffalo, N. Y., and ask for copy "Complete Manhood." They will send it sealed in plain envelope entirely free, for short time.

...A PARIS SCARE

Nearly a Expedition of the Grand Bazaar Horror.

(Special to the Star.)

Paris, August 23.—The Cinematograph which caused the recent fatal fire at the Grand Bazaar de Charite, was yesterday the cause of another fire, which occurred at the Parisians, a Music Hall. As soon as the spectators saw the flames they became panic-stricken and rushed for the street. A number of women were so badly frightened that they fainted. The flames arrived promptly and quenched the flames. Some persons were injured in the rush, but none of them seriously. The fire did little damage.

...ANARCHISTS IN LONDON.

London, August 23.—The Anarchists held a meeting on Sunday afternoon in Trafalgar Square and the utterances of some of the speakers provoked disorderly scenes. The police, however, had taken precautions which effectually prevented any serious development.

...EHEAD DEARER IN TORONTO.

(Special to the Star.)

Toronto, August 23.—The Bakers' Association has called a meeting to be held immediately to discuss the advisability of raising the price of bread to keep pace with the rise in the price of flour. The majority of the city bakers favor the proposed raise, which must go through or cause them a considerable loss.

...CARTER'S Little Liver Pills

The only perfect Liver Pill.

Take no other, Even if Solicited to do so.

Beware of Imitations of Same Color Wrapper.

RED.

...TO THE LEFT OF THE MAIN ENTRANCE, IN THE MAIN BUILDING.

The Dunlop 20 miles Road Race, held on Kingston Road, Saturday, 21st August, was again won on a



Fitted with Buckeye Tires, by W.M. GREATRIX, in the fast time of 45 minutes.

The Gendron Wheel has also won the 100 MILES ROAD RACE AT CHATHAM. 20 MILES ROAD RACE AT KINGSTON.

Riders of the Inter-Club Road Race, to be held on the 11th September in Montreal, ride a GENDRON if you wish to win.

GENDRON MANUFACTURING CO., Ltd. 2418 St. Catherine Street, Montreal. 19621

SUBSTITUTION the FRAUD of the day.

See you get Carter's, Ask for Carter's, Insist and demand

...The Dunlop 20 miles Road Race, held on Kingston Road, Saturday, 21st August, was again won on a

...The Dunlop 20 miles Road Race, held on Kingston Road, Saturday, 21st August, was again won on a

The wells belong to the Ontario Natural Gas Company. It is said this company has an output of 50,000 feet of gas a day at present, and can easily supply Detroit without assistance from the Ohio fields. An 8-inch pipe is to be laid under the river at an estimated cost of \$50,000.

"A steel cable one and a half inch in diameter, travelling at the rate of 12 miles per hour, can transmit nearly 2,000-horse power," says the *Electrical Age*. "But by taking a copper wire one square inch in section and applying to it a potential equal to that which is in use to-day in at least one place in this country, viz., 10,000 volts at 1,000 amperes per square inch, we find we are transmitting in an invisible form over that wire more than 13,000 horse power, which is enough to rupture instantly six such cables as are ordinarily used in operating a cable railway."

An American journal describes a shot-firing appliance, which can be attached to any form of safety lamp, and is known as the "Roberts Shot-firing Lamp." The following are the essential features of this apparatus:—A brass tube 5-16 in. in diameter is inserted through the oil cistern and its top is terminated in a brass box covered with gauze. A hole is made in the tube opposite the flame, and is normally closed by a "sleeve" pushed up by a spring. The lower end of the tube is also closed by a plate pushed over it by a spring. A blow-pipe also passes through the oil cistern, and is closed like the lower end of the tube. To fire the fuse it is pushed through the tube, and the sleeve being drawn down, the flame directed on to the end by the blow-pipe. When it is certain that sparks will not be thrown from the end of the fuse it may be withdrawn from the tube.

A new kind of elevator for use in mines is mentioned by the English mining journals. It is constructed so that one side exactly balances the other. On one side is a large cage on which a loaded car is run, to be hoisted to the top of the mill, and on the other is a huge iron tank capable of holding sufficient water to raise the car, load and carman to the top. The carman, from his station at the bottom, pulls a rope which opens a stop cock and fills the tank with water, at which the tank descends, and the cage, containing car, carman and all, rises to the top of the bin, when the car is dumped. The carman then pulls another rope, which opens a valve at the bottom of the tank and lets the water out; thus the cage and car, now being the heaviest, descends, its movement, of course, being always under the control of the operator or carman. The cage is provided with strong brakes, capable of holding it and the contents stationary at any point, either in going up or coming down, and the whole is hung on an 8-foot wheel by a 1½-inch wire rope of great holding capacity.

Not long since at Springbank colliery, Airdrie, Scotland, a trial took place of a Rigg and Meiklejohn coal cutting machine. The machine was one of the usual size, 7¾-inch diameter cylinders, and was worked by compressed air at a pressure of 40 pounds per square inch. It was worked by 4 men, 1 to attend to the machine, 2 laying rails and setting props, and another followed the machine clearing out the cut to let the coal drop. The cut was 3 feet under in a seam of coal 2 feet 8 inches thick, and the wall to be cut was 70 yards long. This whole length was cut in 1 hour and 30 minutes, which at this rate would mean a cut of considerably over 300 yards per shift of 8 hours. The whole was done in a very satisfactory manner. Mr. William Cassels, the manager, says: "We can cut easily 300 yards per shift. The machine is 7 feet 10 inches long over all, 2 feet 10 inches wide, exclusive of cutter, and 1 foot 10 inches high on the rails, and the air pressure at the machine is 35 to 40 pounds, and this is quite enough. The grip cut by this machine is only 2¾ inches to 3 inches deep, and this results in a large saving of hand coal as against hand labor."

As we go to press we are advised that in the suit against the Dominion Coal Co., referred to elsewhere in this issue, the Supreme Court of Nova Scotia, on the 24th inst., reversed the decision of Judge Townshend and ordered a new trial.

Is there anything new under the sun? asks the *Railway Review*, and here adds: Soloman was right. The more the past is explored the more evident this becomes. A pre-historic blast furnace is the latest discovery. Professor E. Petrie, in 1890, convinced himself that in a remarkable mound called Tel-el-Hesi, in South Palestine, would be found the remains of what was one of the strongest places in the country down to the invasions of Sennacherib and Nebuchadnezzar. The explorations, said Mr. Bliss at the recent Palestine exploration fund meeting, have fully verified this forecast. Amid all the evidence discovered by Mr. Bliss of the civilization of that remote age—wine presses, treacle presses, alkali burnings and innumerable others—by far the most curious is the disclosure of an iron blast furnace, arranged to give strong evidence of being intended to heat, in its descent, a blast of outside air forced through passages before entering the chamber at the level where tuyeres are usually found. "If this theory be correct," says Mr. Bliss, "we find 1,400 years before Christ, the use of the hot air blast instead of cold air, which is called a modern improvement in iron manufacture due to Neilson, and patented in 1828."

A small light "pocket" blasting battery has been brought out by the Nassau Electrical Company, of New York. The battery is made up of chloride of silver cells, each being securely and hermetically sealed; these cells have an E. M. F. of 1.10 volts, with a maximum current of 2.00 amperes, weigh less than 1 oz., are less than 2¾ in. long, and under ¾ in. in diameter.

At the last meeting of the North Staffordshire Institute of Mining Engineers, Mr. J. J. Priest contributed a paper on "Colliery Cost Sheets," which he illustrated by drawings. He observed that there were greater difficulties in carrying out an elaborate system of cost keeping in North Staffordshire than in almost any other district, owing, to some extent, to the mode of working, and partly owing to the fact that in many instances ironstone and coal were drawn not only from the same shaft but from the same seam. It would generally be admitted that some system of ascertaining in detail the cost of labor per ton of minerals produced or paid for was of the first importance to a manager, and unless these accounts were carefully and minutely kept, the management of any mining enterprise was not likely to be economical or successful, as would otherwise be the case. Labor costs were very generally based on the tons produced or paid for at the pit, and were therefore only useful as a means of comparison with the labor cost of previous pays. It was a common custom in some districts a few years ago for the subordinate heads of departments to make out their own wages and cost sheets. This system had the advantage of impressing on the memory of those officials the cost per ton of each class of labor working under their immediate authority, but that system in late years had become more or less obsolete. The services of such persons were generally thought to be better utilized in the active superintendence of their particular departments, while the work of making out the wage sheets and cost sheets was now generally performed by clerks. The cost sheet would in all probability be made out on the "tons accounted for," otherwise "disposed of," and these would in nearly all cases show a greater or less—generally less—quantity than the tons paid for at the pit, the discrepancy arising from refuse and dirt picked out of coal, allowance to customers, variation in the tare weight of trucks, &c., all adding to the probability that less tons would be "accounted for" than the colliers were paid for "getting." In some instances the cost was worked out on the production—that was the coal paid for at the pit—but he maintained that the most accurate plan was to work out the statement entirely on

the "tons accounted for," all fuel consumed on the works being charged for as materials, at market prices, while coal put to stock on the ground was valued at much less than current market prices, on account of the deterioration which naturally took place; coal in wagons or on the pit bank might or might not be taken into consideration in the "general cost sheet," his experience being adverse to its inclusion, as the quantity of coal paid for and not yet accounted for in this direction usually balanced itself month by month. He made suggestions respecting dealing with rents, rates and taxes, and spoke of the advantage of the slide system.

Coal Outcrops.

This was the subject of a paper read by Sir William Dawson before the Society of Students of Mining Engineering of McGill University, at the opening of the session of the Society on the 26th ulto.

A typical coal-bed was defined to be a fossil bog or swamp, with an underclay or ancient soil beneath, full of carbonized roots, and a roof of shale or sandstone above, often containing fossil leaves or trunks of trees. Some of the latter are occasionally found to stand erect as they grew; and being replaced by stony matter, they form what have been called "coal-pipes," which when the coal beneath has been removed by mining, sometimes fall into the workings, causing accidents to the miners. The coal itself is shown by the microscope to consist of layers of compressed and carbonized vegetable matter. In some exceptional beds, chiefly of cannel coal, there is no true underclay, and the coal in this case seems to have been produced by the bursting or discharge of bogs pouring vegetable debris over submerged flats. By continuous or intermittent subsidence and renewed deposition, it usually happens that several beds of coal are found to occur, separated by intervening shales and sandstones, in the same locality.

The coal-bed formed in either of these ways is at first horizontal and covered up with earthy beds of greater or less thickness, deposited upon it, and whose pressure has contributed to its condensation and preservation. It has thus no outcrop except where it has been cut across by the channels of streams, or by the action of the sea on coasts, when the edge of the bed may appear in the banks of ravines or canyons or on coast cliffs. Coals of cretaceous and tertiary age in a horizontal or nearly horizontal attitude crop out in the banks of rivers in many places in the Canadian North-west, and may be mined by levels run in from the river valleys. Even coals of the true carboniferous period sometimes retain their horizontality, as in parts of the Ohio coal-field. Usually, however, the movements of the earth's crust have thrown the beds into synclinal valleys and anticlinal ridges, and when the crowns of the anticlinals have been removed by denudation the edges of the beds appear at the surface or covered only by soil and loose material, and the outcrops of the several beds of the same series run in lines more or less parallel to each other. In this case the beds may be seen to dip in different directions and at different angles with the surface. Such an outcrop when exposed and examined, enables the explorer to ascertain the thickness and quality of the bed, the character of its floor and roof, its horizontal course or strike, its direction and angle of dip; and in connection with these facts, the directions along the surface in which it can be traced, the depth at which it can be reached at any given point, and the area under which it can be profitably mined. All these facts and inferences can be learned from a very small opening, provided it exposes the whole breadth of the outcrop. Additional information may be obtained from the outcrops of the beds associated with the coal, wherever these are exposed.

But since the beds of coal are not unlimited in extent, and since the crowns of anticlinals and the bottoms of synclinals are not always parallel to the surface, we may expect the reverse dips on the opposite sides of synclinals not to run parallel to each other, but to curve round

and join each other at the ends of the troughs or basins. We must also make allowance for the manner in which the outcrops bend backwards in crossing transverse ridges or forwards in crossing transverse valleys. These points were illustrated by the arrangement of coal-beds in Eastern Cape Breton, which have been said to run up on the land like a series of stranded boats. These outcrops also show the manner in which anticlinals bringing up hard rocks sometimes form ridges, and when they bring up softer rocks which have been denuded away, appear as hollows. The various appearances presented in this way were shown by a map, and also the curving and widening out of the series of outcrops when the angle of dip of the measures diminishes.

The effects of faults were then explained and illustrated, and the manner in which they may repeat the outcrops of beds of coal, or may render them discontinuous. Special illustrations were given of these disturbances from the great faults in the Pictou coal-field, which were at one time so perplexing to explorers.

Cape Breton was then taken as an example of the submergence and erosion by the sea of the outcrops of coal-seams. Limited portions of the outcrops of coal-seams dipping more or less toward the sea appear in many places around the older rocks which form the nucleus of Cape Breton. Only a small part of many of these coal areas remains on the land, while there is reason to believe that they extend widely over the sea bottom both east and west, and that they are continuous under the sea with the coal-fields of Nova Scotia proper and Newfoundland. Thus a large part of the mineral fuel of Cape Breton as well as of Nova Scotia lies under the sea, and it was shown to what extent these submerged coal districts may be made available. It was also shown that the amount of accessible coal not yet mined is enormous, and that the mining of coal in the maritime provinces of the Dominion admits of a great expansion, if a profitable market can be found either in Canada or elsewhere.

COMPANIES.

New Glasgow Iron, Coal and Railway Co., Ltd.—The following is an excerpt from the Directors' Report submitted to the shareholders at the last annual meeting:—"Your Directors are pleased to advise the continuous operation of the furnace during the entire year, resulting in an increased production of iron. The various services of the Company have been well maintained throughout the year. A good deal of difficulty was experienced and some expense incurred in keeping the railway and other outdoor operations going during the excessive cold of the past winter. A subsidy was voted by Parliament at its last session for the extension of the railway five miles, but your Directors have decided that under existing circumstances it would not be prudent to proceed with the work at present. As all are aware, the year has been one of great depression in all lines of trade, but possibly none have felt it so keenly as the iron business in its every department. That we have been able to do even as well as we have, is, in the opinion of your Directors, a matter for congratulation. The amount of the profits after two years' operations have been \$110,814.59."

Nova Scotia Steel and Forge Co., Ltd.—Owing to extreme commercial stagnation, covering a large portion of the year, neither the volume of business nor the prices realized by this company were as large as the previous year. Notwithstanding the earnings of the company have been fairly satisfactory. The profits of the year (ended 30th June, '94) were \$61,281.52, to which is added the balance at credit of profit and loss carried forward from last statement, \$2,943.68; or a total profit of \$64,225.20. On recommendation the amount was distributed as follows:—Reserve for insurance against bad debts, \$4,000; reserve for depreciation of plant, \$11,500; 8 per cent. dividend on preference stock, payable 5th Sept., \$18,174.45; 8 per cent. on ordinary stock, payable on 10th October, \$26,664.00; leaving balance forward of \$3,886.75.

Drury Nickel Co., Ltd.—A special meeting of the stockholders was held at the office of the Company in the Township of Drury, Ont., on 26th instant, for the following purposes:—

- 1st. To authorize the proper officers of the Company to place a mortgage on all of the Company's property for the purpose of paying the debts of the Company.
- 2nd. To authorize a sale or transfer of all the property of the Company for the purpose of paying the debts of the Company.
- 3rd. To authorize an order to wind up the affairs of the Company.
- 4th. To do any and all things necessary to a proper transfer of all of the property of the Company, for the purpose of paying the debts of the Company.
- 5th. To transact any other business that may legally come before the meeting.

Broad Cove Coal Co., Ltd.—The officers of this Company, incorporated at the last session of the Legislature of Nova Scotia, are:—John M. Raymond, *President*; Alpheus P. Alger, *Vice-President*; William Penn Hussey, *Treasurer and General Manager*; Edgar S. Buffum, *Secretary*; Warren D. King, *Electrical Engineer*; Directors, Wm. H. Munroe, of Martha's Vineyard; George W. Gale, Boston; John Y. Pazant, Halifax; Hon. John M. Raymond, Salem; Warren D. King, Peabody; Hon. Alpheus B. Alger, Cambridge; Edgar S. Buffum, Salem; J. R. Naegeli, Zurich, Switzerland; William Penn Hussey, Danversport. The American Loan and Trust Company, of Boston, of which S. Endicott Peabody, of Salem, is president, is trustee of the company, holding a deed of trust for \$1,000,000 as a guarantee of payment of principal and interest of bonds. The areas controlled by the company cover

MY KINGDOM.

comes to go and tell Dr. Blair and name very little about the ground; and she says she will go to the ground and see what she can find.

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to anything, I don't always go to the ground. I don't always go to the ground. I don't always go to the ground.

FROM THE STRAITS OF MASS EXPRESSION. The light is on the side of the street. The light is on the side of the street. The light is on the side of the street.

rough and primitive condition which the children of the world, and the children of the world, and the children of the world.

THE HISTORY OF DANCING.

Despite all the efforts of the school, dancing has not been taught in the schools. Despite all the efforts of the school, dancing has not been taught in the schools.

FAMILY Gossip.

Children in this neighborhood are very much interested in the family gossip. Children in this neighborhood are very much interested in the family gossip.

THE BABY IN BREAKERS.

The baby in breakers is a very common sight. The baby in breakers is a very common sight. The baby in breakers is a very common sight.

How a Ruffed Grouse is Made. The British War Department has issued a circular regarding the ruffed grouse. The British War Department has issued a circular regarding the ruffed grouse.

THE CHINESE LABOR QUESTION.

What has become of the Chinese question in this country? The Chinese labor question is a very important one. What has become of the Chinese question in this country?

BLANK PAPER.

Blank paper is a very important commodity. Blank paper is a very important commodity. Blank paper is a very important commodity.

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ate, in the rock, within from six to twenty
feet of the surface. These wells do not over-
flow; but the water rises to nearly the sur-
face of the ground, and perhaps a foot or
two above the waters of Lake Winnebago.
Professor Chamberlin thinks the source of
supply is to the westward, and less than ten
miles distant.

The question of the water supply in the
shallow artesian wells is complicated by the
fact that frequently sand-pockets of large
area, filled with gravel, sand, and water are
met with, interpolated between

THE UPPER AND LOWER CLAY,

or between the more recent surface clay and
the more ancient drift deposit of the same
material. A few years ago, when the city
authorities were constructing a tunnel be-
neath the north branch at Division street, for
the water mains, at a depth of nine-
teen feet below city datum, and several
feet below the bed of the river, a
sand pocket, of dimensions so large as to
make the word pocket a misnomer was
found. It was more like a long beach. The
water rose in the shaft a foot or two above
the level of the river, and this was the fact
which enabled the City Engineer to assume
that it was not river water. Two powerful
steam pumps, pumping together 350 gallons
per minute, were set to work, and were kept
busy about two days before the water was
exhausted, when at length it was all re-
moved, and no further trouble experienced:
but in the meantime the docks for several
feet on both banks of the river perceptibly
settled, and old wells which had always
yielded water since their construction were
suddenly discovered to be dry, and persons
living a half a mile from the river west in-
quired what had been done to drain their
wells. The shaft was sunk about seventy-
five or eighty feet from the river. Similar
trouble was met with when the excavation
was made for the pumping engines at Ash-
land avenue and the South Branch, which
seems to indicate that the river has some-
thing to do with supplying the water.

It appears that the lower sand and lime-
stone measures are formed of alternate solid
and impervious layers and broken and
cracked strata. In deepening the well at
Garfield Park a few years ago, the contractor
came across a layer of rock which

goods cheaper to be shipped to New York than they will sell the same goods to be shipped to San Francisco or Canada, because in the former place they met American competition and in the latter they do not. The duty on beveled plate glass is the same as that on plain and Mr. Donnelly argued in favor of a discrimination, especially as regards all sizes below 10x15, for the benefit of American workmen engaged in the industry.

Mr. Bodine made a strong statement in opposition to the proposed reduction in window glass. Although materials are cheaper than ever the manufacturers have found it impracticable to adjust themselves to the reductions by the act of 1883, and consequently many furnaces are idle. A further reduction would destroy the industry and throw 100,000 men out of employment. There are 126 glass furnaces in fourteen States. The capacity of the furnaces is 3,500,000 boxes a year, but last year only 2,900,000 boxes were made, while 950,000 boxes were imported under the present rates of duty. In the production of window-glass 80 per cent of the cost consists of labor, and wages in the glass industry of the United States are 150 per cent higher than in Belgium, the chief competing country. The prices of window-glass now are much lower than ever before, even under the revenue tariffs from 1846 to 1860. After the tariff of 1883 was enacted the manufacturers tried to reduce the cost of production in order to meet the changed conditions. The results were the closing of many furnaces and the immediate advance in the cost of window-glass of more than 100 per cent to the American consumer. At present prices the cost of the glass for twelve windows would amount to about \$2.50. These are such windows as a thrifty mechanic would put in when he built a new house. The tariff of 1883 reduced the duty about 13 cents per box; the present bill proposes to take off about 25 cents more. The result would be the ruin of the American industry and injury to the American consumer.

Mr. Balch, of New York, an importer, replied. He said the American manufacturer had prospered under a duty of 15 per cent and that the English are "spoiled children."

ful bride before received the intentions. Mr. about 55 years 000 or \$5,000, 25, and though wealth she is rich a fair type.

FOR SALE

FOR SALE—
Washington st.

Vernon av., near story and basem rooms, in excellen
Vernon av., just did two-story ma octagon stone fr respects, \$10,000.

Vernon av., near 29x132, \$85 per fo Adams st., near and sub-cellar, oc rooms, \$13,000.

Paulina st., jus well-built two-stor
Ogden av., sout also on Thirteenth
Halsted st., near \$75 per foot.

Racine av., near stone cellar, fram

A fine piece of m near Van Buren, basement, brick

For sale by TUB

FOR SALE—

FOR SALE
ner Harris
able for
deep.

300 fee
have
for flats
feet deep.

This propo^{ed} of

boilers, class is at Mr. West Madison ty feet of clay, arteen feet of e water in this e—softer than propriator for it is much ater, and the he neighbors ke water for . I asked Mr. if he would riving

Y DATUM, a surveyor to ark of the sur- e lake. This oncrete floor, erminates. I height of the fact that it is he pumping t the institu- water, when stood about rface, which e from the ell is a prize It seems to water. The . Swalley was e street and a suggestive ll is stopped et within the was reached ly moderate, ee if it could ank 70 feet g in the least iment seems ing rock is d about 20 down some- ts. Some of cient supply gallons per inimum sup- e case a sand n a boring roil avenue hausted ex- for eight to hrough the e the drill by perature in ner, ranges

se shallow le. The fact is at or very en rise to

water is de- connecting Michigan. It ds of these rflows at an e the lake Besides, the ough varying al at No. 405 er and freer while most of egnated with g steam. It s affected by

too brittle for the drill to pass through until a large cavity had been broken down and removed. The contractor of the new well recently finished for the West Park Commissioners, in the angle of the boulevard leading from Douglas to Garfield Park, says that at a depth of 1,148 feet the drill reached a seam about five feet across.

THE DRILL DROPPED

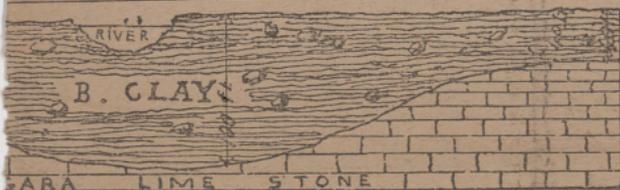
that distance before touching solid rock again. In the meantime the water in the well, which had been overflowing, ceased entirely to reach the surface and sunk to a level of about three feet from the top and remained there until the seam was completely shut off by tubing. This well was sunk to a level of 2,317 feet. It contains 196½ grains of solid matter in each gallon of water, more than half of which, or 134½ grains, is common salt. This large seam, and the fact that it caused the overflow to cease for six weeks, or until the flow could be shut off by tubing, is a curious fact.

The boring of so many wells in the city has made it comparatively easy to determine the topography of the surface, were the overlying mass of clay and drift entirely removed. It may be said in general that the Chicago River would flow nearly where it does now if the clay were entirely removed. In other words the main river and two branches lie over depressions in the Niagara limestone corresponding to the river. The deepest clay is under and on both sides of the river north and south and along the branches. In the path of the main river, and for a distance of several squares either side, it is 100 feet deep and over in some places. At Indiana street and the North Branch it is 135 feet deep, and further up the river it ranges from 60 to 70 feet in depth. At Twenty-second street and Canalport avenue it is 100 feet deep; at Eighteenth street it is 70 feet deep. Between the South Branch and the lake, at Libby, McNeil & Libby's packing-house on State street and Sixteenth, the clay is 55 feet thick, and at the Consumer's Gas Company's well at Twenty-fifth and Hanover streets it is 37 feet thick. At 405 West Madison street it is 90 feet thick.

WERE THE DRIFT WHOLLY REMOVED

from the underlying limestone and the water of Lake Michigan kept from flowing in, the surface would be no longer a plane; a rocky knoll over 100 feet in height would appear at Milwaukee avenue and the old toll-gate, having quite a wide area at top.

Similar high elevations would appear at Eighteenth and Robey streets, and at Twenty-fourth and Archer avenue; while a ridge of rock would extend westward to the Desplains at Lyons. At Van Buren street on the North Side there would be an ascent of 60 feet to a rocky upland at Sixteenth street extending southward. These ridges are upheavals, as shown by the dip of the strata in general, coinciding with the slant of the surface, as at Archer avenue, Eighteenth street and Cicero quarries, and particularly the rocky ridge of Stony Island near South Chicago. These elevations were in existence when the drift clay was laid down, as is shown by the planed-off surface of Stony Island, and the fact that the rock thus removed by glacial action is found in the tough clay which is deposited as a tail to this crag in a southwestern direction. The following cut gives a general appearance of the rock surface at the mouth of the river.



CROSS SECTION ACROSS THE RIVER SHOWING DRIFT.

adjacency to the of the water tive evidence not broad and

ys: There are as within and ara limestone ar it as to re- e the crevices umerous in the measures. At irth street, at in the north- a little fur- e wide areas, the fissured d ultimately here the drill the quarry of south of the d, the miners' driven in the est. Water to

In conclusion, the facts seem to show that the water in the shallowest artesian wells has its source in the limestone outcroppings about and within the city, and partake of the qualities of the rocks through which it passes in a pretty direct line from the outcropping to the lowest portions of the Niagara limestone. In some cases, as at No. 405 West Madison street, the channel is a bed of sand and gravel, and the water is therefore very soft and pure. In others, as at the wells at Sixteenth and State streets, where there is iron and inflammable gas, the water doubtless passes through a rock rich in the products of organic remains. The overlying clay rests firmly and everywhere upon the rock, and fills the superficial centers for several feet.

they have received "big subsidies;" they have not improved the quality of their goods; they want to impose a tax on light and sunshine.

WORSTEDS AND WOOLENS.

An interesting and important statement was submitted showing that under the present classification of worsteds and woollens the former, although made of exactly the same material and by a process more expensive than the latter, are admitted, if valued at less than 80 cents per pound, at a rate of duty about 30 per cent lower than the latter. Moreover, it is difficult for even an expert to tell the difference between worsteds and woollens. The manufacturers of aniline dyes submitted a statement asking that the duty on certain raw materials which enter into the composition of those colors be abolished. A representative of the new salt fields in New York entered his protest against the proposition to place salt on the free list. During the last four years \$2,000,000 have been invested in this industry, all of which will prove a dead loss if the bill is carried. Salt is now sold at the works at 8 cents per bushel.

CAPITAL CHAT.

PERSONAL AND OTHERWISE.

Special Telegram to The Inter Ocean.

WASHINGTON, March 9.—Hotel arrivals: At the Riggs—Mrs. E. S. Stickney and Miss Hammond, of Chicago. Willard's—M. J. Dorney, Chicago.

M. B. Koon, Minneapolis, and J. A. Minot, Minneapolis, are in the city.

The Senate Committee on Appropriations will report an amendment to the urgent deficiency bill providing \$30,000 for the payment of the funeral expenses of the late General Grant.

Postmasters appointed: Dakota—Jefferson, B. Bivoulette; Hoskins, G. W. Stone. Illinois—Gooding's Grove, P. Wagner; South Elgin, T. J. Masterson. Indiana—Fallen Timber, L. L. Wilson. Kansas—Richfield, late Brandley, E. F. Stevens. Minnesota—Springhill, H. S. Ley.

B. Spooner, a brother of Senator Spooner, was admitted to the floor of the House to-day under the belief that he was the Senator. The gentleman was greatly embarrassed by the courtesies shown him by the doorkeepers. He could not see any reason why he should be urged to "walk right in."

The House Committee on the Judiciary, by a vote of 7 to 8, directed an adverse report upon Representative Oates' bill prohibiting aliens from acquiring title to or owning lands within the United States. Mr. Oates will make a minority report and endeavor to secure the passage of the bill in the House.

In the executive session to-day the Senate rejected the nomination of the new postmaster at Hamburg, Iowa. It is stated upon good Senatorial authority that all appointments made to fill vacancies created by the suspension of ex-Union soldiers or their widows will be rejected. This will operate in a number of cases in Iowa and Nebraska. Friends of officials who have been suspended, but who are yet in possession of their offices, advise them to "hold the fort."

Among the patentees who received patents to-day are the following Chicagoans: Victor H. Becker, distributing valve and also ammonia evaporator for refrigerators; Chas. J. Coyle, securing bosoms to shirt bodies; Charles M. Culbertson, snow-plow and scraper; John R. Cummings, clamping tool and also type; George P. Holsblaub, safety top for elevators; William Phenix, carrying traction cables around curves; Robert Spurgin, index for letter-books; Axel A. Storm, frame for sack drills; Levi W. Yaggy, portfolio or case for anatomical charts.

The Election Committee of the House listened to the reargument of the Hurd case from Ohio to-day, and fixed next Friday week for a vote. They also decided to hear argument in the case of Campbell vs. Weaver, from Iowa, on Thursday of this week. General Weaver is terribly exercised over the new Iowa Congressional apportionment bill, and is whistling like the boy going through the graveyard to keep up his courage. He intends to be a candidate again, and said yesterday he would make a map of the new Sixth District that would carry the district again for him. He is in hopes Campbell will not be renominated.

The panorama of the second battle of Bull Run or Manassas, which the Chicago company are exhibiting here, affords some entertainment, but is not down in

and within one depot. Harrison by five other lines easy.

FOR SALE—
F st., next block from each, brick fronts, he ments, and well feet; seven room tain bathing tub basins, and supp sewer connection terest.

At this number

FOR SALE—
F and basement Apply to E. A. W

FOR SALE—
F property m

FOR SALE—
F \$2,000; 5 mc lots shown free; schools, literary

FOR SALE—
F easy mont specialty. F. W

TO RENT—
F proof, elev commodious. suites in Nixon had on May 1 if for them; also Insurance com men are invit PRUSSING, 10

WANTED—
F Gregory 1 given; \$5 to \$1 000 now in use CO., 93 Dearbo

WANTED—
F tleman, States to intro ing; \$15 per v us a postal an

CLAIREV

ATTENTIO
ness, law deaths; ladies return mail. home.

ATTENTIO
nowned a you a fortune k kee, Waukeshaher. 268 North

FREE-ME
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SE

FOLEY &
F sewing-mac lowest prices. business remov

WANTED—
F chine—Wilk Will pay \$35. A

A NO. 8 W
F genuine Sing

99-100 o.
or partial sets w PALMER, 125 St

BEST \$5 SY
half rates. DR. DAY'S Den Elevator 75 Mad

STORAGE F
S hold goods— patrons. Rates r Co., 381 and 383

GEORGE PA
G st. Storage fo etc. Advances in

B. A. L. THO.
F. Thomson, Y dealers in office s

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F other printin A. L. C

PERSONAL
F ing business wife: you

class for modeling in clay and wax. nature. For terms, etc., please apply at the above address.

OMO & BRYSON, ARTISTS, PORTRAITS
in pastel, oil, crayon, and water-colors. Instructions given on reasonable terms. Studio, 189 Wash st. A. V.

CARLING'S ART SCHOOL-LESSONS IN
pastels, crayons, oil and water colors, portraits, landscapes, etc. Studio, 88 State: take elevator.

ARITHMETIC, BOOK-KEEPING, WRITING, grammar, spelling, shorthand, etc., thoroughly taught at the Metropolitan Business College, opposite McVicker's Theater; experienced teachers. Pleasant rooms, and a thorough course of study.

HOTELS.

KUHNS' EUROPEAN HOTEL, 163 TO 169
South Clark st. First-class in every respect. Rates 75c to \$2 per day. W. J. KUHN & SON, Props.

ST. LAWRENCE EUROPEAN HOTEL-74
and 76 Adams st. between State and Dearborn. Don't pay high prices; elegant rooms, 50c to \$1 a day.

CLARENCE HOBBS, NORTH CLARK,
corner Ontario st. Aqueduct family hotel, noted for the peculiar excellence of its cuisine.

MEDICAL.

SITUATION WANTED-BY CAPABLE GER-
man woman to work in kitchen of restaurant or to out washing. Address for two days, MRS. A. SURE, 106 South Sangamon st. basement.

SITUATION WANTED-FOR GENERAL
housework, 130 Monroe st.

SITUATION WANTED-BY A CANADIAN
girl: a position as cook, or would do general housework: good references. Address E 65, Inter Ocean.

Cooks.
SITUATION WANTED - POSITION AS
first-class cook in a private family by Protestant American woman, by April 15: references given. Address "D." 477 Prospect st, Cleveland, Ohio.

Housekeepers
SITUATION WANTED - POSITION AS
housekeeper or charge of furnished rooms. Address H, 777 Clough av.

Laundresses.
SITUATION WANTED-FAMILY WASH-
ing done at home. Washing, 30c; ironing 50c. MRS. WOLFF, 140 W. GAY, Marion st.

The first of these wells was that of Mr. W. F. Bloom, which was made a short time before the great fire. It is situated at the corner of Thirty-fifth and Bloom streets. Mr. Bloom began to dig in the clay in the old-fashioned way, with pick and spade, for water. After he had gone forty feet he came upon the solid rock or hard pan. He then began to drill a shaft one and five-eighths inches in diameter. After passing through two feet of hard pan, two feet of shale, and about three feet of limestone, the drill dropped a few inches, and

A COPIOUS SUPPLY OF WATER

was the result. The water passing up through this small aperture, quickly filled the well, some five feet in diameter. Mr. Bloom made a persistent effort to pump the water out, using a common suction pump and a chain pump, and failed to make an impression on the bottom of water. He filled the well up to within a few feet of the top with broken bricks and stone, and then made a curb about it. The water in this well is sweet and

as was soon discovered, however, that as the number of wells sunk to this depth increased the flow of those already made decreased, untill some of them ceased to overflow altogether. The well at Central, now Garfield Park, at first rose to a height of forty feet and yielded forty-three gallons per minute. The supply grew less as new wells were made, untill the Park Commissioners tried an experiment to prove whether the supply was common to all the wells. At their request all the wells in the city, with one or two exceptions, were closed for several hours, when it was discovered that the water rose to a considerably greater height than usual in all the wells. This was regarded as conclusive evidence that they were fed by a common reservoir and also that the water quite freely flowed from one to another. From the time that it became evident that the supply from the old wells would certainly be diminished by every new well, the well-diggers turned their attention to ascertaining whether a lower stratum of

Sciences last night Mr. Leander Stone read a paper on "The Artesian Wells of Chicago." This is printed in full below:

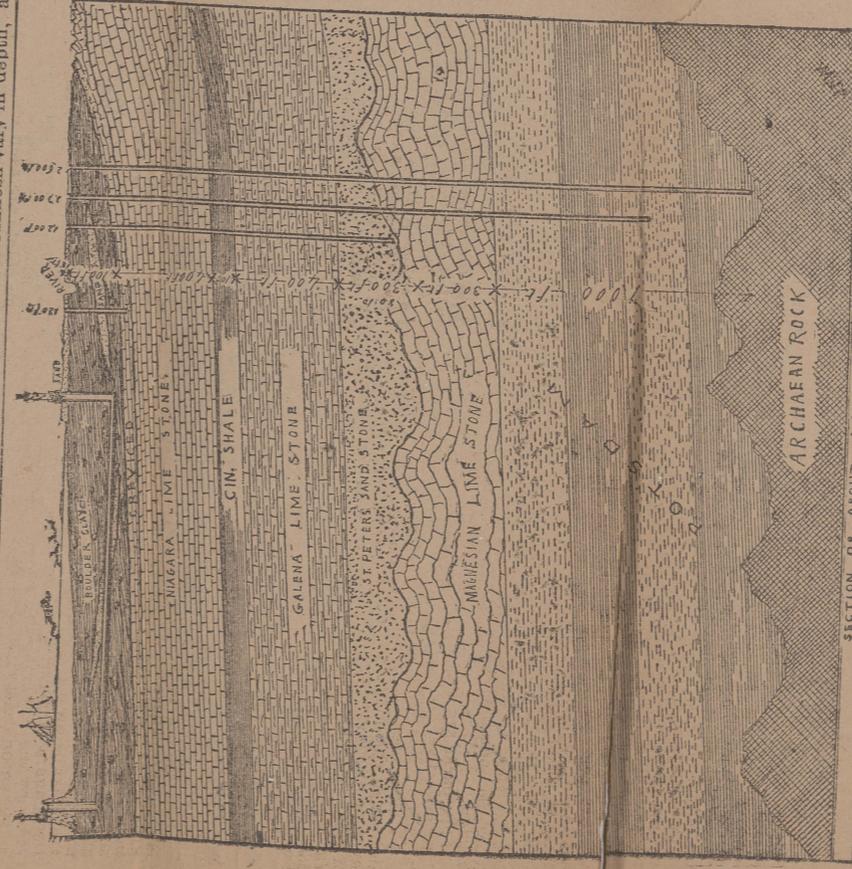
The water supply of Chicago is one of the most important subjects that can engage the attention of its citizens. The lake is the most natural source, but the fact that the greater part of the sewage flows into it, particularly at certain periods of the year, makes the subject of a pure-water supply quite difficult.

Something like twenty years ago the first artesian well at the Union Stock Yards was bored, the depth being about 1,200 feet. A little earlier a well was sunk in the northwest part of the city called "The Artesian Well," because it was the first in the city. The object sought was oil, not water; but at the depth of something like 1,200 feet a good supply of water was obtained. Before the fire a considerable number of artesian wells had been made, all of which, I believe, overflowed and gave a very free supply of water. After the fire a great impetus was given to the business. Wells were bored in a number of places at the heart of the city—at the corner of State and Washington streets, at the Palmer House, at J. V. Farwell's wholesale house on Franklin and Monroe streets, at the Singer Building, and at other points. Every Stock Yards has one or more artesian wells. There are nineteen in this region, yielding each day of ten hours 1,065,000 gallons. Nearly or quite

ALL THESE WELLS are pumped to their full capacity, and so made to yield a much larger supply than would be obtained through the natural overflow.

At the parks are several wells; in the West Park, one; Lincoln Park, two; South Park, one. Nearly or quite all the distilleries and malt-houses have wells; and the total number in the city and immediate suburbs must be nearly or quite eighty. If the ratio of yield were the same in all as at the Stock Yards the total amount of water raised each day would be about 4,500,000 gallons; but the ratio is much less and an estimate of 3,000,000 each day from all the artesian wells would be much nearer the truth.

The rocky strata which underlie Chicago, it is well known now, are substantially like those of Eastern Wisconsin, and dip to the east or southeast rising to the surface at various points at a distance west of Lake Michigan. These rocks form the lowest group of sedimentary deposits, and are commonly known as the lower Silurian. From the products of the drill in excavating the shafts which are sunk through these layers, as well as from the outcropping, it is known that next below the bowlder or drift clay lies the Niagara limestone, which is followed in order by the Cincinnati shales, the Galena and Trenton limestones, the St. Peter's sandstone, the lower magnesia limestone, the Potsdam sandstone, and the archæan or crystalline rocks. I have had a sketch of the order of the rocks drawn, as well as a rough representation of the proportional thickness of each.



SECTION SHOWING THE SEDIMENTARY ROCKS UNDER CHICAGO.

It will be seen that there are in Chicago four different classes of wells, according to the depth. First, there is a considerable number which go no further than just below the clay and into the superficial layers of the Niagara limestone. There are perhaps twenty of these wells, in all of which, with one exception, the water stands at a level not far from that of Lake Michigan.

Second, there is a large number of wells which reach down to 1,200 or 1,250 feet and end in or near the St. Peter's sandstone. Nearly all the wells sunk soon after the great fire, and for several years before, were put down to this level and yielded copious supplies of water, which overflowed with various degrees of force and copiousness.

According to Professor Chamberlin, and are from fifteen to one hundred feet.

The shallow wells of Chicago, which pass through the blue clay and "hard pan" into the upper layers of the Niagara limestone, have caused some debate as to the source of supply. In these wells, as a rule, the water rises to a point not far from the level of the lake, and thus the opinion has been formed that they are fed from the lake, which backs up through the crevices in the limestone. As the rock is exposed under the water of the lake at various points, such an opinion appears plausible. A careful consideration of the facts only will enable us to form a correct opinion.

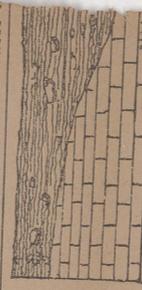
surfaces very small, only about

per minute. Mr. Charles Pope has one house at No. 488 North State about three hundred feet from the lake, and the water is almost pure lake water. The Hucknaby corner of Canalport avenue street, has one of the wells at a level of about above the river. It is the shallow wells that overflow passes through ten feet of feet of clay, five feet of boulders, and several feet into the yields about forty-five gallons.

Near the corner of Market at on the North Side, is another which, after reaching the rock pumped out completely feet the water flowed into it freely ing seems to have freed the v which clogged the openings in base of the bore.

The wells of the class constructed on the North Branch of water can not be used in steam One of the finest wells of this Jennings' laundry at No. 405 street. It passes through nine six feet of hard pan, and fine rock, in a gray limestone. The well is perfectly soft and pure lake water. It is used by the washing purposes, for which better adapted than the lake water is sought by many of it and used in preference to drinking and culinary purposes Arting Stail, the City Engineer, not mark a bench at this well, and he very kindly deputized run a level to the well. The mayor is 1,454 feet above the mark is 6.25 feet above the where the tube of the well was unable to measure the water in the well, owing to the inaccessible by reason of the machinery, but the foreman of the well was completed, twelve feet from the surface would be less than a foot lake level. The Jennings' worth far more than it cost. have an unlimited supply of deepest of the wells sunk by Mr. near the crossing of Larrabee North avenue. Here was tried experiment. Usually the drill after reaching from 12 to 20 feet limestone. In this well water at 20 feet, but the flow was about 19 or 20 gallons, and to be increased the drill was further, but without augmenting the flow of water. This experiment to prove that the water-bearing superficial, and does not exceed feet. This contractor has put thing over twenty of these wells them have failed to yield a sufficient minute being regarded as the only which can be utilized. In one pocket was found in the clay made near the intersection of Canal and Ada street, which was not except by vigorous steam pumping ten hours. Usually in passing clay water had to be supplied to pouring in at the top. The temperature of all these wells, winter and summer from 50 to 55 Fahrenheit.

The source of supply for the wells is not altogether easy to settle that the water stands in the well near the level of the lake has given



the rock which is in close contact with several wells. The diversity seems to afford strong presumption that the supply is local and general.

The facts seem to be as follows: various more or less wide are near the city where the Niagara comes to the surface, or so receive the rain, which sinks into crevices and cracks which are more numerous than in the deeper layers. Archer avenue and Twenty-fourth and Lincoln streets, western portion of the city, and other west in Cicero, are quite where the rains fall upon rocks and sinks into it, an finds its way below the clay, water of the well-borer meets it. At Dolose & Shopper, in Cicero, Burlington and Quincy Railroad families get water from wells limestone to a depth of thirty

	Whitka.	South Evanston.	Rogers Park.
Clay, etc.....	207	74	72
Limestone.....	320	316	308
Shale.....	198	174	185
Limestone.....	216	247	238
St. Peter's sandstone.....	167	212	458
Red Marl.....	32	45	317
Limestone.....	46	114	12
Potsdam sandstone.....	356	274
Total depth.....	1,205	1,670	1,620

The table is such that read from left right the order is south and toward Chicago. The Lake Bluff well is something like thirty miles from that of Rogers' Park. The Niagara limestone, the Cincinnati shale and Trenton limestone, it will be seen are quite uniform in thickness. The St. Peter's sandstone shows a great thickening at Rogers' Park and South Evanston while next below it is a peculiar bed called red marl, which seems to begin somewhere north of Lake Bluff reaching its maximum depth at Winnetka and thence out at South Evanston and between that and Rogers' Park disappears. This red marl lying next below St. Peter's sandstone is the equivalent of an easily broken un-homogeneous rock which is quite uniformly found in the Chicago well shafts. It seems to be neither sand or lime, more or less fragmentary and easily crumbled. Mr. Starnford, ex-President of the West Park Board, says that in sinking the Garfield Park well to a lower depth, this rock was so easily broken down, that a cavity of something like a barrel in size was formed before the drill began to perforate the more solid rock below.

In addition to the above classes of wells, it should be said that in the northeastern part of the city, in the vicinity of the old fort on Milwaukee avenue, there are several wells yielding a good supply of water at a depth of only about 800 feet. These wells are all within a half a mile of each other, and I have not learned of any others in the city. It appears to be a local vein which is not met with any where else.

THE SOURCE OF THE WATER SUPPLY for the lower water-bearing rocks is easily accounted for, since all the lower strata rise to the surface at successive distances at altitudes west of Lake Michigan, and at altitudes which would give a pressure sufficient to force the water to and above the surface of the highest bluffs on the coast. In Wisconsin wells have been bored at Sheboygan, Milwaukee, Racine, and Kenosha, and the strata which are water-bearing at a depth of many hundred feet on the coast crop out in the interior, those at Sheboygan, near Beaver Dam, those at Milwaukee, at or near Beaver Dam, those at Racine, at Jamesville, and those at Kenosha, at the Rock River. These inland points are each enough higher than the surface at the lake to cause an overflow at the lake shore; and artesian wells at points west from the shore grow less in depth as they are distant from the lake. The shallow wells at Oakbrook vary in depth, ac-

Wagonway, a large necessary, built house, 27 rooms, lot 7x125, \$3,000, antiseptic property, on Canal st., lot 5x150, with a two-story and building, 5x100, \$25,000. ALER & BOND, 102 Washington st.

HARRISON ST.

3-400 feet on southwest corner of Harrison st. and 1st st. 25 stories and Hats, 100 feet

ALLEY.

25 on this front sold; or for manufacturing, 120

SEBOR ST.

is centrally located, being within half mile of most of the freight cars pass it, and it is accessible for horse-cars. Prices low and terms

J. W. HEDENBERG,
102 Washington st., Room 6,

TWO HOUSES ON WHIPPLE west from Sacramento st., second Madison and Van Buren sts., pressed brick, 20x20 feet, lots 24x120 built and bath rooms; bath rooms complete, wader closets, and marble wash tub with hot and cold water. Good as in street; long time and low interest. FRANKS & CO. 628 West Jackson st., every evening.

3304 WABASH AV., 2 STORY sit home front dwelling, brick stable. AFRIDEL, 39 Washington st.

OUR MARCH LIST OF CITY allied postpaid on application. BAIRD & BRADLEY, 50 LaSalle st

Suburban.

LOTS AT CHICAGO LAWN, monthly payments; abstracts furnished free to city 6 cents. Good soil, good and musical societies, no saloons. JOHN F. EBERHART, 161 LaSalle st.

WOODLAWN HOMES ON 1st, 2nd, 3rd, 4th, 5th, 6th, 7th, 8th, 9th, 10th, 11th, 12th, 13th, 14th, 15th, 16th, 17th, 18th, 19th, 20th, 21st, 22nd, 23rd, 24th, 25th, 26th, 27th, 28th, 29th, 30th, 31st, 32nd, 33rd, 34th, 35th, 36th, 37th, 38th, 39th, 40th, 41st, 42nd, 43rd, 44th, 45th, 46th, 47th, 48th, 49th, 50th, 51st, 52nd, 53rd, 54th, 55th, 56th, 57th, 58th, 59th, 60th, 61st, 62nd, 63rd, 64th, 65th, 66th, 67th, 68th, 69th, 70th, 71st, 72nd, 73rd, 74th, 75th, 76th, 77th, 78th, 79th, 80th, 81st, 82nd, 83rd, 84th, 85th, 86th, 87th, 88th, 89th, 90th, 91st, 92nd, 93rd, 94th, 95th, 96th, 97th, 98th, 99th, 100th, 101st, 102nd, 103rd, 104th, 105th, 106th, 107th, 108th, 109th, 110th, 111th, 112th, 113th, 114th, 115th, 116th, 117th, 118th, 119th, 120th, 121st, 122nd, 123rd, 124th, 125th, 126th, 127th, 128th, 129th, 130th, 131st, 132nd, 133rd, 134th, 135th, 136th, 137th, 138th, 139th, 140th, 141st, 142nd, 143rd, 144th, 145th, 146th, 147th, 148th, 149th, 150th, 151st, 152nd, 153rd, 154th, 155th, 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could not be found, which would yield a supply unaffected by the upper water supply. New wells were put down to 2,000 and even 2,200 feet, when a supply was found equal or superior to that in the St. Peter's sandstone. This forms the third class of wells.

The fourth class is deeper and in one case reaches the depth of 2,604 feet, or within thirty-six feet of a half mile. One general fact seems to be borne out by the analysis, and that is that the deeper the wells the greater the amount of solid mineral matter. The Lehman well, near the corner of Diversey avenue and North Clark

pure, and has never failed, although it has been freely used by the neighbors for many years. It has been believed that the water stands at a level with the lake, and rises and falls with the lake-level.

Some time later Mr. A. S. Piper sunk a similar well, a short distance from Mr. Bloom's, at the corner of Ashland avenue and Twenty-seventh street. This well shaft passes through 56 feet of clay and $14\frac{1}{2}$ feet of rock. The diameter is 3 inches. A fire engine was employed for some time in a vain effort to exhaust it. It is used to supply a horse barn and about forty horses. The

the wells yet sunk or likely to conditions seem to be quite similar at Oshkosh, Wis., where artesian wells of three kinds are put down to reach the city its supply of water. The first are sunk to the drift clay and beneath that to the Niagara limestone. The second are put down through the drift clay to what Professor Chamberlin calls the Niagara limestone, which consists of part sand and gravel and lies immediately beneath the Niagara limestone. The third are like the shallow artesian wells. Professor Chamberlin says

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CHICAGO ARTESIAN WELLS.

Paper Read Before the Chicago Academy of Sciences by Leander Stone.

Where the Water Comes from—Character of the Water-Bearing Rocks.

The Supply for the Artesian Wells Not from the Lake.

At the meeting of the Chicago Academy of

street, is said to be the deepest artesian well in the State, and the deepest flowing well in the United States. It is 2,604 feet and 6 inches in depth, and contains in each gallon of water over 322 grains of solid mineral matter, or more than half of 1 per cent. Two hundred gallons of water, evaporated, would leave more than a gallon of solid sediment, much more than half of which would be common salt.

Most, or perhaps all, of the wells 1,200 feet deep contain too much lime to permit of the water being used in making steam. The well of Mr. Lehman doubtless extends nearly to the archæan rocks, as represented in the diagram. I am indebted to the kindness of the Hon. William Bross for procuring for me from the contractors carefully recorded sections of four wells along the lake shore north of the city. A comparison of the four, one of which is owned by Mr. Bross (the Winetka well), will afford some interesting statistics. In order that they may be more readily considered I here group them together.

water is pure and good, but analysis.

Mr. F. S. Swalley has constructed a number of these wells, with 12 inches through the clay and 18 inches through the rock. Messrs. Libby, McNeil & Co., engineers, have two wells near Sixteenth streets, within about 8 feet of the lake. The pumping of the one does not affect the supply of the other. The wells pass through about 15 feet of clay and hard pan, and 55 feet in the rock. The water is impregnated with iron and sulphur, and not be used in steam-boilers. Mr. Swalley reports that he has several times used gas which rises through the wells in the morning after the wells have been used through the night. The supply is very small.

There is another of these wells near the seventh street and the lake, which is owned by the United States Distilling Company. It passes through 27 feet of sand, 30 feet of hard pan, and 13 feet of rock.

B. W. THOMAS,
27 PORTLAND BLOCK,
CHICAGO.

get away with the beauty
 are "the boys" in Wall street
 lightest "point" as to his in-
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 of age, and is worth \$4,000,-
 000. Miss Hildreth is about
 she possesses little worldly
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south of Thirty-fourth st., a splen-
 dsard, basement and sub-cellar,
 ont, brick house, complete in all

Thirty-fifth street, east front, a lot
 ot.

Ashland av., two-story basement
 tagon stone front, brick house, 14

t south of Harrison, east front, a
 y frame dwelling, lot 50x125, \$7,000.
 east corner Western av., fronting
 st. and Raleigh ct., two lots \$4,800.
 Centre, several lots, 22x125 each,

**A LIST OF SECOND-HAND PIANOS FOR
 sale, beginning March 8.
 SQUARES.**

1 Geo. Steck.....	\$150
2 Kimball.....	175, 200
2 Hallet & Davis.....	200, 225
1 Chickering.....	300

UPRIGHTS.

1 St. Louis Co.....	\$150
3 Kimball.....	\$160, 170, 175
2 Emerson.....	200, 225
2 Hallet & Davis.....	265, 275
2 Chickering.....	300, 325

GRANDS.

Chickering, Hallet & Davis,
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W. W. KIMBALL CO., STATE AND ADAMS STS.

LYON & HEALY.

State and Monroe sts.
 Steinway, Fischer, Lyon & Healy, and other pianos.
 Bardett and Lyon & Healy organs. Largest stock
 of instruments and best-lighted warerooms in the city.
 Terms cash or time to suit customers.

**STEINWAY'S MATCHLESS PIANOS—
 LYON & HEALY.**

State and Monroe sts.
 Beware of Bogus Instruments,
 Both new and second-hand, represented as genuine
 Steinway Pianos.

LEFT WITH US ON SALE—A FINE
 large upright piano, nearly new, 7¹/₃ octaves,
 triple-string; price, with cover and stool, \$135 cash
 or payments. J. O. TWICHELL, 150 State st., one
 flight

Once: good, steady job. FRAZEE & SON, Ar-
 bany, Mo.

WANTED—SHOEMAKER FOR REPAIR-
 ing; a young man. 2714 Cottage Grove av.

WANTED—TAILORS ONE PANTS-MAKER
 and one bushelman. 110 S. Halsted st.

WANTED—TINNERS; APPLY AT FAC-
 tory of the Chicago Stamping Co., corner Har-
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WANTED—PAINTERS; CORNER GILPIN
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WANTED—PHOTOGRAPHER (RETOUCH-
 er); a first-class man; none other need apply.
 305 E. Division st.

WANTED—PRESSER: GOOD HAND ON
 coats; none other need apply. 144 LaSalle,
 Room 37. GOLDMAN.

WANTED—COOK, YOUNG MAN FOR DAY
 work. Crystal Restaurant, 66 S. Desplaines st.

WANTED—DRAWER-MAKER FOR SEW-
 ing-machine work. 224 W. Ohio st.

WANTED—FEEDER (GORDON); A FIRST-
 class hand. CHAS. J. JOHNSON, 102 Madison st.

WANTED—CABINET-MAKERS, ALSO
 finishers; wage from \$2 to \$2.50 per day for
 good men. Apply at 257 Division st.

WANTED—CALCIMINER; AN EXPERI-
 enced man; none other need apply; 50 Wells
 st.: board and room.

three miles river front, five living springs, 400 acres cultivated, 200 head of graded cattle, and farm implements, for \$22,000. We have also 160,000 acres near the Yellowstone east of Miles City, Mont., \$165 per acre.
J. S. RANNEY & CO., 157 Washington-st.

REAL ESTATE WANTED.

WANTED—A RESIDENCE IN DESIRABLE location, in good suburban town—Evanston, Kenwood, Austin, or Riverside; wish to trade 8 desirable lots in Philadelphia clear of incumbrance and title perfect; worth \$5,000 cash; will assume balance.

T. B. BOYD, Room 14, 131 La Salle-st.

WANTED—HOUSE AND LOT, \$2,000 TO \$3,000; will give finely-furnished rooms and cash difference. Address C 77, Tribune office.

WANTED—CHEAP LOT, 40X60 OR MORE, for barn within half a mile of Lake-st. bridge. M. R. B., 86 La Salle-st., Room 17.

WANTED—TO BUY OR LEASE—HOUSE, stone or brick, in city or suburbs near city, with not less than 14 good rooms; must have all modern conveniences and be in good locality, North Side near Lincoln Park preferred. Address K 23, Tribune office.

TO EXCHANGE

TO EXCHANGE—\$5,000—8 FINE BUILDING lots (clear and perfect title) in growing part of city of Philadelphia, Pa.; street cars in half a block; want Chicago or suburban property; will assume or pay \$3,000 cash difference; will give some one a first-class trade.

T. B. BOYD, Room 14, 131 La Salle-st.

TO EXCHANGE—4 NICE RESIDENCE LOTS, splendidly located, in Philadelphia, Pa.; clear title; street cars one block away; want Chicago property and will assume mortgage. T. B. BOYD, Room 14, 131 La Salle-st.

CLAIRVOYANTS.

ATTENTION—CONSULTATION ON BUSINESS, lawsuits, absent friends, love, marriages, deaths; ladies specially invited; letters answered by return mail. MRS. FRANKS, 14 Laflin-st. Always at home.

ATTENTION—MRS. BISSARA, TRANCE, business medium, describes, gives names; fees, 50c; magnetic treatment. 255-257 South Clark-st.

MME. CATHRINA, THE NOTED DAUGHTER of Rhineland, tells past, present, and future; gives satisfaction in any case you may call for. Mme. Cathrina, with her giantess strength and magnetic power gives massage treatment. Consultations, \$1; treatments, \$3 to \$5. Can be consulted from 10 to 12 and from 2 to 7, 41 S. Clark-st., near Lake, Room 30.

MISS FLETCHER (CLAIRVOYANT), Massage and magnetic treatment. Lady attendants. Parlors 215 State-st., one block south Palmer House.

MISS BELLE, CLAIRVOYANT, MASSAGE and magnetic treatment given. Parlor 10, 173 State-st., opposite Palmer House.

MRS. DELACY, CARD AND PALM READER, gives names; advice; magnetic treatment; ladies special attention. 1913 Wabash-av.

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WANTED EUROPEAN

CHICAGO WATER SUPPLY.

SOME INTERESTING FACTS RELATING TO ARTESIAN WELLS FURNISHED BY MR. LEANDER STONE.

Mr. Leander Stone read an interesting paper on the water supply of Chicago before the Academy of Science at Weber Music-Hall last night, Dr. Andrews in the chair. Mr. Stone reviewed the history of artesian wells in Chicago from the first which was bored some twenty years ago. There are some eighty artesian wells in Chicago at the present time, nineteen of which are at the Stock-Yards, yielding in ten hours 1,065,000 gallons when pumped to their full capacity. At the West Side parks are five, at Lincoln Park two, and at South Park one, besides all the distillery and brewery wells. All the Stock-Yards wells reach down 1,200 feet, but at Diversy street, north of the city-limits, is a well sunk 2,604 feet, or nearly down to granit or crystallized rocks. A cleverly-executed cut and diagram showed the various layers of sand, bowlder clay, Niagara limestone, Galena lime, Cincinnati shale, St. Peter's sandstone, magnesian lime, Potsdam and Archæan rock into which the wells have been sunk, and some interesting descriptions of wells sunk into layers of sedimentary rock at Lake Bluff, Winnetka, South Evanston, and Rogers Park were given, showing the exact thickness of the rocks mentioned in the cut at ~~these~~ ^{Stock-Yards} various points. Every new 1,200-foot well diminishes the volume of water in the other wells, and it is with a view of preventing this that all wells being bored at the present time are run down to the 2,000-foot level. Mr. Stone's paper dwelt very fully on shallow 120-foot wells and the source from which they draw their supplies, it being contended by some engineers that the water backs up from the lake through the creviced rocks and stands at the level of the lake. The wells do stand about the level of the lake, but Mr. Stone's theory is that the rainfalls and not the lake water is what they contain. The boring of so many wells in the city has made it comparatively easy to determine the topography of the surface, were the overlying mass of clay and drift entirely removed. A well at Sixty-eighth street and Evans avenue, near Oakwood Cemetery, has been sunk ninety feet, or some fifty-five feet through clay and about thirty-five feet down through the rock, and a test made yesterday with soap showed that the water is almost as soft as rain water and the supply abundant. It is believed that there is an abundant supply of good, wholesome water which is naturally filtered by the creviced rocks, and it is desirable to test the capacity of supply instead of continuing to use the lake water, mixed as it is with sewage.

THE CHICAGO HERALD

having some in-
tion; correspond-
if desired. See
av, Chicago.

a farmer's widow
healthy, and of amiable disposi-
e strictly confidential and returned
Matrimonial Bureau, 2118 Wabash

BOOKS.

CHAPIN'S BOOK STORE IS LOCATED
at the large store, 91 Dearborn st., four doors
north of Washington, one block north of old store;
cash always paid for books of all kinds in any
quantity. Don't forget **CHAPIN'S**, 91 Dearborn st.

CLOTHES CLEANED AND DYED.

GENTLEMEN'S GARMENTS CLEANED,
dyed, and repaired. Ladies' dresses, shawls,
sacques, plumes, etc., beautifully cleaned or dyed.
COOK & McLAIN,
80 Dearborn st. and 261 West Madison st.

ARTISTS AND PHOTOGRAPHERS.

TAYLOR & MARTIN, FORMERLY GEN-
tile & Co., 81 State st, are giving 12 fine cabinets
and one large colored panel for \$2. Can not be beaten
at any price for beauty of finish.

BUSINESS CHANCES.

\$3,000 TO \$5,000 CAN BE DOUBLED
yearly by a good man in a safe and
legitimate monopoly. Address F 70, Inter Ocean,
Chicago.

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PERCOLATES THROUGH THE ROCK

and into the wells, and, in this case, these wells are not more than twenty or thirty rods from the quarry. As an indication of the amount of water which these exposed rocks carry below the clay, it may be mentioned on August 2, when something over five inches of rain fell within twenty-four hours, the steam pump at the Eighteenth street quarry was operated all day Sunday, all of Sunday night and until Monday noon before the men could work. This engine has a cylinder of ten inches stroke and eight inches in diameter, with sixty strokes a minute. This would raise about 172,000 gallons in twenty-four hours. In a year there is a total rainfall in this country of about 40 inches, which would give eight times as much water to carry off in the twelve months. The upheaval which throws up the rocks to the surface where these quarries are reaches the Desplaines at Lyons, as Dr. Henry M. Baumber reports in the Illinois Geological Survey. This gives a wide area for rainfall and would seem to afford a good supply for all

THE RAILWAY.

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Our Coal Fields and our Capitalists.

We insert with great pleasure the follow-
ing extract of a letter written by Principal
Dawson of McGill College, Montreal, to a
friend in this Province. The intimate ac-
quaintance of the writer with the carbonifer-
ous formations of Nova Scotia and Cape
Breton is known and recognized throughout
the scientific world. We fully agree with
our distinguished countryman that our people
are not sufficiently alive to the importance of
the "new era on which they are entering"
through the development of the extensive
coal fields which recent explorations have
proved to exist. The lethargy or want of in-
telligence apparent on the part of our cap-
italists in such matters is almost incredible.
Nova Scotia has to rely on British, American
or Canadian capital for the development of
her vast mineral resources, while *she per cent*
and Bank Stock engross all the energy and
means of our Provincial milltimores. In-
stead of being a benefit to the Province, their
capital is often a positive injury to it, acting
as an effectual damper on all mining under-
takings. Repeatedly, during the past five years,
parties in Nova Scotia and Cape Breton who
have failed at home in obtaining aid to open
up mines, and have been driven abroad
to apply to foreigners, have been met with
the natural query—"If your country offers
such inducements for the investment of capi-
tal, why do not your own people among
whom there are many wealthy men, take
hold of your mines?" To those who know
the Province the answer is plain. Strangers,
however, can hardly believe such a state of
things.

It is certainly high time that
more of our coal mines should be owned by
Nova Scotians and opened up by Nova Scotia
capital. We are glad to find that the Inter-
colonial company which is being formed to
work the Campbell area will consist, if not
of Nova Scotians, at least of British Ameri-
cans. Principal Dawson says:—
"I can assure you that my visit to my na-
tive place after a lapse of nearly nine years
has given me much pleasure, and that I have
been especially gratified by witnessing the
evidence everywhere apparent of prosperity
and healthy growth. More especially is this
the case with the remarkable development
of mining industry, which has proceeded
from the opening of the Mines to public com-
petition. This was foreseen by those who
knew anything of the vast undeveloped re-
sources of Nova Scotia; but its rapidity and
extent have surpassed expectation. In coal
and gold particularly the results have been
wonderful, and from facts that came under
my observation I am disposed to believe that
these industries, as well as the Iron manu-
factures, are on the eve of new and greater
developments.

The veins of auriferous quartz, which I
saw in the mines near Halifax are of a char-
acter to encourage more extensive and regular
mining operations than are at present pur-
sued, and the methods of extraction of the
gold, still necessarily imperfect, are in process
of rapid improvement, nor is there any reason
to doubt the extension of rich gold veins
throughout all the belt of metamorphic
country from Cape Cansuan to Yarmouth.
I was very much struck with the remark-
able coal productions on the East River,
Pictou. The extension of the main seam
and its associate beds to the westward multi-
plies threefold, the previously known capa-
bilities of the Pictou coal field, and the pecu-
liar manner of that extension throws further
light on the probabilities of an eastern ex-
tension of the coal to Merigomish, which
has been greatly strengthened by the discovery
of coal beds near New Glasgow, on the
bank of the conglomerate also a very curious
fact, and when those are more fully explored
they will throw much light on the geological
peculiarities of the Pictou coal area.

Mr. Poole's observations published in our
Canadian Naturalist in 1860 had proved that
west of the area of the General Mining As-
sociation the coal beds were suddenly and
greatly bent back to the southward; but
their direction beyond that bend, and extent
and value were unknown until the recent
discoveries of Mr. Campbell and others.—
The extension round the curves of the strata
in McLehlan's Brook, is at present in the
same state of uncertainty; but I have no
doubt that practical search will solve these
difficulties also, and that similar laws of ar-
rangement to those ascertained between the
East and Middle Rivers will be found to hold.
Until I visited the ground I had some doubt
as to whether the great new seams found on
the Campbell and Carmichael lots might not
be the continuation of the "deep seam" of
the old area, but I no sooner saw it as ex-
posed in the opening made by the Acadia
Company than I recognized my old friend the
"main seam," somewhat shrunken in size
but improved in quality. I was therefore
quite prepared to look for the "deep seam"
in its proper place under the main seam at
Campbell's mine, where it was subsequently
found by Mr. Kobb and Mr. Campbell. I
think it should be a subject of congratulation
to us that this fine property is to be worked
by British Americans. The associates in
this enterprise are some of our first and best
business men and I have no doubt will do
justice to the enterprise, at the same time I
am glad to think that Mr. Campbell whose
sagacity and perseverance are worthy of all
praise is likely to be substantially rewarded
for his labour. I have not given up hope
that you may find coal on the north side of
Pictou harbour, though perhaps too far from
the shore to be immediately available; every
chance discovery leading to this result should
be carefully attended to, and followed up by
such trials as could be made without too
great expense. I do not, however, antici-
pate, for reasons which I published long ago,
that the beds north of Pictou harbour will be
found equal to those on the East River. The
opening of the mines already, however, and
the extension of the Provincial Railway to
Pictou harbour, must give an immense stimu-
lus to the country. I am not usually over-
sanguine in such matters, but I think the
people of Pictou scarcely sufficiently realize
the importance of the new era on which they
are entering in consequence of these great
improvements.

The editor of the P. E. Island Ex-
aminer, in noticing Mr. Howe's pamphlet on
Confederation, says: "Here we see a gen-
erous spirit worthy of a great intellect. We
wish that all our friends, on our side of po-
litics would be as forwarding with us in what
appears to them to be our ering way in the
matter of Confederation. We need not say
that we will give Mr. Howe's pamphlet a care-
ful perusal, as we do all his utterances; and
we feel assured that he will think none the
worse of us if it leaves our hands unconver-
ted to his views." This coming, as it does
from the pen of a strong Unionist, and a man
of unquestionable abilities, forms a pleasing
contrast to the vindictive aspersions of those
signites who are endeavoring to disparage the
world-wide fame of our patriotic and talent-
ed countryman.

Montreal and Pictou Coal Company.

The importance attached by Dr. Dawson,
in his letter which we publish to-day, to the
beds of coal on the southern flank of the
great conglomerate, opposite New Glasgow,
now being worked by Mr. Haliburton and
others, induced us on Monday last to pay
to descend into the working pit which is now
being sunk. It is 14 feet by 6 feet, and is
now 100 feet deep. The proprietors intend
working the coal at a depth of 200 feet. The
pit has already passed through one hard or
seam of coal 11 feet in thickness. This was
succeeded by excessively hard bands of fire-
clay and freestone of 21 feet, and the pit is
now passing through another seam of coal 9
feet thick, beneath which there is another
seam of excellent quality, the thickness of
which has not yet been proved. No doubt is
entertained that these beds of coal are the
equivalents of the main seam. Professor
Leslie a few years ago predicted that the
main seam would be found, either converted
into one solid seam from its parts giving out
or divided into several workable seams by the
partings increasing in size. The first idea
has been verified in the Campbell seam, and
the second at the locality of which we are
speaking. On ascending the hill where the
works are situated, we were greatly struck
with the panoramic view of the extensive
valley in which the Pictou Coal Basin is sit-
uated. Below us lay the East River with
New Glasgow to the left, and the railway
bridge crossing the River, and the Albion
Mines village to the right. To the north
we could see McLennan's mountain forming
the Southern limit, and Fraser's mountain
the northern boundary of the coal field, en-
closing a valley which winds out of sight in
the direction of Merigomish. The foreman,
however, did not seem to care so much for
the picturesque as we did, considering it a
much more interesting feature in the land-
scape that a gradual incline of a few hundred
yards would suffice to connect the works
either with the Provincial Railway, or with
a shipping place on East River. This un-
doubtedly is an important point. We under-
stand that Mining Engineers in their estimate
consider £5,000 will be sufficient to put the
Provincial Railway, with an incline to
the Merigomish Coal Company, and all the workshops, &c. neces-
sary for such works. All these local advan-
tages will save the enormous outlay usually
necessary before getting at the "black
diamonds."

The Company now being organized to work
this property is incorporated under the name
of the Montreal and Pictou Coal Company,
and has our best wishes for its success.
The same seams must cross under the
river and town of New Glasgow, following
the course of the conglomerate towards
Fraser's Mountain, in which direction the
Merigomish Coal Company are also exploring
for the northern crop of the Albion Mines
seams. Should they be successful we shall
not fail to pay them a visit. When it is re-
membered that hitherto these seams have
been supposed to be at least 2000 feet deep near
New Glasgow, the importance of finding
them in a workable position at our very doors
can hardly be over-estimated. Until very
recently almost every one regarded the ex-
plorations opposite New Glasgow as a very
fore, have done a good service to the public
by perse ering until they proved their point,
and we trust they will be handsomely repaid
by the result.

We may state that the coal turned out has
the appearance of being a very good quality.
Part of the 9 feet seam consists of very hard
coal, which at first sight, persons unacquain-
ted with it, would pronounce to be nothing
else than black rock. It is in reality, how-
ever, similar to coal used for smelting pur-
poses. When lighted it burns with a steady
flame and emits a great heat. We under-
stand that Mr. Haliburton intends having it
thoroughly tested in a few days; when we
hope to be able to inform our readers as to
the result.

The *Colonist* of Monday republishes that
Mr. Downie's (?) article of the *Sun* on the Pictou
Railway, and considers it "a perfect vindic-
cation of the policy" of the Government and
"a handsome tribute to the uprightness and
honesty" of Mr. Fleming. Judged by their
actions neither the Government nor their
master (Fleming) possess *five cents worth* of
honesty or uprightness; and we can assure
the *Colonist* that neither its violent vituper-
ations nor the white washing of the *Sun* can
clear the skirts of those who mismanage our
public works. We have made certain state-
ments in reference to the Pictou Railway,
and we challenge the *Colonist* to disprove
them. Surely Dr. Tupper's organ does not
mean to insult the Pictou *Standard* by charg-
ing the editor with "mercenary motives,"
and insinuating that its violent philippics
"have emanated" from a "vile source."
Of course we expected no better treatment
from a paper which delights in vilifying its
neighbors, and indulges in the free use of
such choice epithets as "long-eared Span-
iards," applied to gentleman of high stand-
ing and undoubted ability. We are not
dependent for our existence on the caprices
of the *Colonist* and its master, and while we
can treat its scurrilous editorials with contempt
we are content to let the people of Pictou
County judge as to the "uprightness and
honor" of Fleming and the Government.

Rev. Mr. Downie, pastor of the
Presbyterian Church at Antigonish, took his
departure from that town on Tuesday, the
2nd inst. Previous to his departure two ad-
dresses were presented to him,—one by a
deputation of his late congregation, and one
by St. Andrew's Division Sons of Temper-
ance. To these he made appropriate replies.
In noticing Mr. Downie's departure the An-
tigonish *Casket*, (a Roman Catholic Jour-
nal) remarks:—

"We have learned with regret that the
Rev. Mr. Downie left Antigonish on Tuesday
last, to devote his talents and energies to the
good of the church to which he belongs in
another and distant land. During his stay
amongst us, he has made no enemies, and
continued daily to enlarge the circle of his
friends and admirers. No one acquainted
with him here can fail to wish that his future
life may be as happy and prosperous as his
many excellent qualities of mind and heart
are well known and appreciated."

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THE SOMERVILLE LECTURES

Inauguration of the Series Last Evening

BY SIR WILLIAM DAWSON.

"The General Geographical Relations of Canada" the Title of His Lecture.

The Somerville course of lectures, being given under the auspices of the Natural History society, will no doubt become exceedingly popular. Last evening "The General Geographical Relations of Canada" was treated at the society's rooms by Sir J. W. Dawson, some 200 persons being present. Professor T. Wesley Mills occupied the chair and introduced Sir William in a brief speech.

The lecturer stated that it had been hoped this introductory lecture would have been delivered by Dr. G. M. Dawson, who has done so much in the explanation and illustration of the physical geography of Canada; but circumstances having prevented this, he had undertaken to present some thoughts of a general character as introductory to the course on natural resources of the Dominion. Any efficient treatment of our natural resources must be based on the scientific study of the physical geography or physiography of the country. Mineral resources are dependent on geo-

AGRICULTURAL CAPABILITIES.

Another subject to be included in the course is agriculture, and here you will have the advantage of the results of the excellent researches carried on at the Experimental farm at Ottawa. Measured by the extent of land to be cultivated in comparison with the number of hands to cultivate it, our agriculture must be yet in its infancy, and this conclusion is confirmed when we consider the remarkable developments within a few years of certain departments under the influence of thought and enterprise. When we are told that in 1893 Canada produced 134,000,000 pounds of cheese in addition to exporting cattle to the value of seven and a half millions of dollars we need not fear even if the price of our old staple of wheat should fall off. One of your lectures, however, will be devoted to a particular consideration of the wheat question. In connection with this it must be borne in mind that the export of wheat as heretofore provided for, rapidly exhausts our soil, while the exportation of cheese, butter, animals and fruit merely depletes the land of a very little of its phosphates easily replaced, and besides implies better and more scientific culture.

Our forests are no doubt in a critical state. We still have more timber than any other country, but for that very reason we need to be careful not to give away too much to those who are in want of it, or to waste it at home. The time has come for planting and scientific forestry, and attention to these matters might enable us to supply the world for centuries and leave abundance for ourselves. Our little export of twenty-six millions of dollars

one which, while possessed in the neighboring Republic by only a limited number of men and women of the higher culture, is with us almost universally diffused. After a long educational experience among young men and women from all parts of Canada, I have found them all to be pervaded by a spirit of patriotism and loyalty, and that this mingles itself with their daily work and life and with all their sentiments and ambitions. This was brought fresh to my mind when a few evenings ago I saw the students of our universities uniting in a cordial and enthusiastic farewell to our Governor-General and Lady Aberdeen after their sojourn in Montreal. It was an affair of course entirely spontaneous on their part, and which represented not only a kindly personal feeling, but a sentiment of patriotism and loyalty which is diffused throughout our country, and which is not narrowed altogether within provincial limits, but which extends to the Dominion as a whole, and to the great Empire to which we belong, and to our gracious Queen. Such sentiment, with the intelligent appreciation of the interests of the whole world which flows from it, is as much a national resource as coal or iron, and in some respects of vastly superior value.

In conclusion, permit me to congratulate the Natural History society on the continued usefulness of so enlightened a benefaction as that of the late Rev. Mr. Somerville, and on the excellent list of subjects and lecturers provided for the enjoyment and instruction of our citizens in the present winter.

A vote of thanks, moved by Mr. John S. Shearer and seconded by Mr. Cham-

MUSICAL AND DRAMA

Toronto 'Varsity Boys' Club Windsor Hall.

A POETICAL EFF

Presented to Mrs. Clara Holmes by Enthusiastic -Olivette Well Prodr

Discouragingly small was the excellent was the concert, but as the verdict on the end given in Windsor hall last evening University of Toronto Glee club by Mrs. Clara Barnes Holmes. It was certainly a musical there was not one in the audience was not thoroughly convinced. Encores were decided the entertainers receiving management from a number of students who were located in the first number, "A We Flowing Sea," a part song club, went with a swing, roughly "caught" the audience contributed four more all of which they danced of the most careful detail; but undoubtedly the best was Pinsuti's "In This ended Splendor," given as contributed with a w...

Somerville

is regarded as a great boon
 e of Harbor Grace, the great
 shermen going to Labrador
 and without an outfit from
 here would be a sad tale to
 ably widespread destitution.

THE FAILED BANKS.

closely the condition of the
 scrutinized, the worse the
 those involved in their
 now announced by the in-
 committee that the reserve
 necessary in the case of the
 of the Union bank—which
 addition to the total loss
 as they will be called on to
 r full value a second time
 . It is estimated that not
 e-fourth part of them have
 responding to such a call,
 e three-fourths would be
 solvency. The shareholders
 persons of very moderate
 of them widows, orphans,
 tired business men, etc., to
 ad call means utter ruin.
 ue of the shareholders of
 ial bank, which is in a
 than the Union. Deposi-
 holders in this bank will
 The poverty and misery
 ailure of these banks will
 a year to come.

ATED THE DISTRESS.

has been made of the so-
 cialists" which occurred
 ed sensational accounts
 ad, creating the impres-
 was likely to be over-
 violent mob. In point of
 the disturbance

COMMERCIAL.

[Concluded from Seventh Page.]

clear, \$2 25 @ \$2 60; do straights, \$3 00 @ \$3 25 ;
 do patents, \$3 65 @ \$4 00; low extras, \$1 90 @
 \$2 20; city mills, \$3 20 @ \$3 35; do. patents,
 \$4 00 @ \$4 15. Rye mixture, \$2 20 @ \$2 60.
 Rye flour, easy; \$2 55 @ \$3 00. Buck-
 wheat flour, \$1 60 @ \$1 70; buckwheat, 50c @ 55c;
 cornmeal, steady; yellow, Western \$2 30 @
 \$2 90. Rye, nominal; western, 50c @ 57c. Barley,
 quiet; western, 68c @ 66c; No. 2 Milwaukee,
 64c. Malt, dull; Canada country made, 85c @
 90c; western, 65c @ 75c; two-rowed state, 70c
 @ 72½c; six-rowed do, 75c @ 80c. Peas, Cana-
 ada, nominal. Wheat, sales, 540,000 bushels
 futures; 8,000 bushels spots; spots, firm;
 No. 2 red, store and elevator, 57c @ 57½c;
 afloat, 58½c; f.o.b. 58½c @ 59½c; ungraded red,
 58c @ 59c; No. 1 Northern, 67c @ 67½c; op-
 tions, unsettled; sales included No. 2 red
 February, 57c; March, 57½c; May, 58½c;
 July, 59½c. Corn, sales, 68,000 bushels fu-
 tures; 43,000 bushels spot; spots, firm; No.
 2, 48½c elevator; 49½c to 49½c afloat; steamer
 mixed, 48½c to 49c; No. 3, 48½c to 49½c;
 options, weak; February, 48½c; May, 49c;
 July, 49½c. Oats, spots, firm; options, firm;
 February, 33½c; March, 33½c; May, 33½c;
 No. 2 white, 36½c; March, 33½c; spot No. 2,
 33½c to 33¾c; No. 2 white, 36½c to 36¾c;
 No. 2 Chicago, 34½c; No. 3, 33c; No. 3 white,
 35½c; mixed western, 34c to 35½c; white do,
 36c to 40½c; white state, 36c to 40½c. Feed
 bran, 85c to 90c; middlings, 90c to \$1. Rye
 feed, 85c to 87½c. Hay, steady, 70c to 75c.
 Hops, firm, 3c to 11c. Beef, dull; family, \$9 75
 to \$12; extra mess, \$7 25 to \$7 75. Cut meats,
 steady; pickled bellies, 5½c to 5¾c; do.
 shoulders, 4½c to 4¾c; do. hams, 7½c to 8c;
 middles nominal. Lard, higher; West-
 ern, steam, \$6.95; refined, firm; continent,
 \$7.40; compound, 5½c. Pork, steady, mess,
 \$11.25; extra prime nominal. Butter,
 steady; state dairy, 10c to 18c; do.
 creamery, 13c to 20c; Pennsylvania,
 do. 18c to 20c; Western dairy, 10c
 to 15c; do. creamery, 14c to 24c; do. fac-
 tory, 8c to 14c; rolls, 8c to 14c; Elgins, 24c.
 Cheese, dull; state large, 9c to 11½c; do.
 fancy colored, 11½c; do. white, 10¾c to 11c;
 do. small, 9½c to 11½c; part skims, 3c to 9c;
 milk do., 1½c to 1½c. Eggs, firm; state and
 32½c; refrigerator, 22c to

Ocean Navigation.



Allan Line

ROYAL MAIL STEAMSHIPS.

PROPOSED SAILINGS SUBJECT TO CHANGE, 1894.

Liverpool, Halifax & Portland Royal Mail Service.

From	From	From
Liverpool.	Steamships.	Portland.
24 Jan ...	Mongolian	14 Feb
7 Feb ...	Laurentian	28 Feb
21 Feb ...	Numidian	14 Mch
7 Mch ...	Mongolian	28 Mch
21 Mch ...	Parisian	11 April
4 April ...	Numidian	25 April

And weekly thereafter from Montreal and Quebec.

The Steamers of this service carry all classes of Passengers, the Saloons and Staterooms are in the central part where least motion is felt. Electricity is used for lighting the ships throughout, the lights being at the command of the passengers at any hour of the night. Music rooms and Smoking rooms on the promenade deck. The Saloons and Staterooms are heated by steam.

Ocean Navigation.

DOMINION LINE
 ROYAL MAIL STEAMSHIPS

LIVERPOOL SERVICE—via Londonderry,

1894—Winter Sailings—1895

Steamer.	From	Portland.	From	Halifax
Oregon	Thurs.,	Feb. 7	Sat.	Feb. 9
Labrador	"	Feb. 21	"	Feb. 23
Vancouver	"	Mar. 7	"	Mar. 9
Oregon	"	Mar. 21	"	Mar. 23
Labrador	"	Apr. 4	"	Apr. 6
Vancouver	"	Apr. 18	"	Apr. 20
Oregon	"	May 2	"	May 4

Rates of passage—Portland or Halifax to Liverpool or Londonderry—First Cabin, \$50 to \$70; return, \$100 to \$130, according to steamer and berth. Second Cabin, to Liverpool, Londonderry, Belfast or Glasgow, \$30; return, \$55. Steerage, to Liverpool, London, Londonderry, Queenstown, Belfast or Glasgow, \$15.00. No cattle carried on SS. Vancouver or Labrador. Outfits are furnished steerage passengers free.

The saloons are large and airy, and amidships. Ladies' rooms and smoking rooms have been placed in the most convenient positions. Promenade decks are very spacious and every attention is paid to the comfort of passengers. For further information apply to any agent of the company, or to

DAVID TORRANCE & CO.,
 General Agents, Montreal,
 17 St. Sacrament street.

PICKFORD & BLACK'S



WEST INDIA
 Steamship Lines

ATICAL.
USION
Harnes-
Blouss
sed.

beginning to ending; a series of incidents from real life, so deftly constructed that it would defy the attempt to fortify the destiny of its principal characters. He had not read the book or a synopsis of the play. In this last named particular lies perhaps its greatest merit, judged simply as a piece of handwork from the shop of the producer of plays. The keen intelligence, the ripened experience, the good sense, the well balanced judgment, the wonderful faculty of creating, putting into tangible form the pictures of fancy, making them attractive, too, that Mr. Wilton Barrett possesses in so eminent a degree are constantly in evidence.

Dickson is a "rare" gem.

Dear to the heart of his many admirers, is the character of Tom Stanhope in "Innocent," the now famous comedy with which the brilliant young comedian, Mr. Charles Dickson, inaugurated his stellar career. They will again have an opportunity of witnessing Mr. Dickson in this role, for he returns to the Academy of Music for the week beginning February 11. In the play which made its author famous and laid the foundation of Mr. Dickson's fortunes as a star. "Innocent" has not been seen here for some time, but it is said not to have lost any of its humor in the meantime, but rather that it has gained in flavor. Under the title of "Tom, Dick and Harry," it ran the entire season in London. Eng. Mr. Dickson will also produce two new comedies, "A Jolly Good Fellow" and "Other People's Money."

Mr. Villiers, the world renowned war correspondent and lecturer, who has just returned from the seat of war in China, will deliver a lecture on the Japanese war, with lightning photographs, at the Windsor hall, on Friday, the 22nd inst.

The Creation.
 The plan of reserved seats for this concert given at Northumberland in aid of the "Messiah" concert last Christmas, was not doubtless as great as that for the "Messiah" concert last Christmas.

The Fast Mail.
 In this great success, which presents a score of scenic novelties, one alone has been sufficient to attract the attention of theatre-goers. It is the great freight train in the third act. An engine of perfect design and practical working ability, draws on a full train of fourteen freight cars. This train goes on the side track, an hour. The "Fast Mail" will be at the Theatre Royal next week.

Corwall Notes.
 CORNWALL, February 6.—Grand Organizer Nimmo, of the Sons of Scotland, is at work in the interests of that order in this county. He is in a meeting with good success in his canvass. Glenary Camp, No. 103, has been organized at Williamstown, with 46 charter members, and the brave Highlanders of the county seem to be quite taken up with the order. The grand organizer expects to form several camps in the county in the next few weeks.

New Advertisements
BOOKS.
REMOVAL SALE

We offer the following books at the quoted reduced prices. Many of the books we have only one copy of:

BUY QUICKLY.
International Scientific Series.
 "The Conservation of Energy," by Balfour Stewart, illus. \$1.00, reduced to \$1.00
 "Animal Locomotion, or Walking, Swimming, and Flying," by J. B. Pettigrew, illustrated and colored, .. \$1.00, reduced to \$1.00
 "Animal Mechanism: A Treatise on Terrestrial and Aerial Locomotion," by E. J. Mearns, illus. \$1.00, reduced to \$1.00
 "Fungi: Their Nature, Influences, Uses, etc.," by M. C. Cooke, .. \$1.00, reduced to \$1.00
 "Animal Parasites," by M. C. Cooke, .. \$1.00, reduced to \$1.00
 "Van Oosterhout, illus. \$1.00, reduced to \$1.00
 "Illustrations: Psychological Study," by James Sully, .. \$1.00, reduced to \$1.00
 "Statistics: An Essay on Comparative Moral Statistics," by Professor H. Morssell, .. \$1.00, reduced to \$1.00
 "Myth and Science: An Essay by Rita Vigouli, .. \$1.00, reduced to \$1.00
 "The Science of Politics," by Prof. Sheldon Amos, .. \$1.00, reduced to \$1.00
 "Fables: A View of Logic from the Practical Side," by Alfred Sidgwick, .. \$1.00, reduced to \$1.00
 "Jelly Fish, Star Fish and Sea Urchins," being a Research on Primitive Nervous Systems, by G. A. Rehn, .. \$1.00, reduced to \$1.00
 "The Mammals of the British Islands," by Oscar Schmidt, illus. \$1.00, reduced to \$1.00

Meetings and Dividends.
CUMBERLAND RAILWAY & COAL CO.
 NOTICE is hereby given that the Annual General Meeting of the shareholders of this Company will be held at the Company's offices, Imperial Building, Place d'Armes, in the city of Montreal, on
Wednesday, 13th Feb., at 12.30 p.m.
 The transfer books will be closed from 1st February till after the meeting.
 By order, **H. R. DRUMMOND,** Secretary.

Montreal Cotton Co.
 NOTICE is hereby given that the Annual General Meeting of the shareholders of this Company will be held at their office, No. 37 St. Peter street, in this city, on
Tuesday, the 12th day of February next
 At the hour of Twelve o'clock,
 (at noon), to receive the report for the past year, for the election of Directors, and to transact the business of the company, whether general or special.
 By order of the Board,
D. F. SMITH, Secy-Treas.
 Montreal, January 31st, 1895.

Londonderry Iron Co., Ltd.
 NOTICE TO SHAREHOLDERS.
 The annual general meeting of the Shareholders of the Londonderry Iron Co., Limited, will be held in the Office of the Company, No. 45 St. James Street, Montreal, Canada, at the hour of 3 o'clock p. m., on Wednesday, the 13th day of February, 1895, to receive statements of the Company's affairs, to elect Directors and to transact the business of the Company.
 For the purposes of the above meeting the Transfer Book will be closed from the 1st of this 4th February, 1895, both days inclusive.
JAMES PHYMISTER, Secretary.
 Montreal, 2nd January, 1895.

Almost
Passes Belief
CANCER ON THE LIP,
AND IS CURED BY
AYER'S
SERAPIN

Mr. J. M. Richardson, Georgetown, N. S. W., writes: "I was afflicted with a cancer on the lip, which was so large that it was almost impossible to eat or speak. I was advised to try Ayer's Serapin, and after using it for a few days, the cancer disappeared, and I was cured. I can now eat and speak as usual, and I am very grateful to you for the discovery of this wonderful medicine."

White Star Line
HAMBURG-AMERICAN
PACKET COY.
JOHNSTON LINE
ROBERT REARD & COY.

White Star Line, Hamburg-American Packet Co., Johnston Line, Robert Reard & Co. are advertising shipping services between Montreal and various ports.

La Banque du Peuple
NOTICE.
 The Annual General Meeting of the Shareholders of La Banque du Peuple will be held at the office of the Bank, St. James Street, on Monday, the 4th March next, at THREE O'CLOCK P.M., in conformity with the 15th and 17th clauses of the Act of Incorporation.
 By order of the Board of Directors,
J. S. BOUSQUET, Cashier.
 Montreal, 26th January, 1895.

New Advertisements.
Broken in Health
That Tired Feeling, Constipation and Pain in the Back
Appetite and Health Restored by
Hood's Sarsaparilla.

Mr. Chas. Steele, St. Catharines, Ont., writes: "I was broken in health, suffering from a general tired feeling, shortness of breath, pain in the back, and constipation. I could get no little rest at night on account of the pain. I had no appetite whatever. I was that tired in my limbs that I gave up before half the day was gone. I tried a great number of medicines but did not get any permanent relief from any of them. I then purchased a bottle of Hood's Sarsaparilla, which made me feel better at once. I have had no more of the above troubles since. I feel like a new man. I have a good appetite, feel as strong as ever I felt, and enjoy perfect rest at night. I have had much pleasure in recommending Hood's Sarsaparilla. CHARLES STEELE, with Eric Ferris, Proprietors, Montreal, Canada. Hood's Pills are prompt and efficient, yes easy in action. Sold by all druggists. 25c."

Dr. Lavolette's
Syrup of Turpentine
USED WITH GREAT SUCCESS

For Coughs, Colic, Bronchitis, Loss of Voice, Hoarseness, Whooping-Cough, Croup, &c., &c.

Montreal Turnpike Trust
 NOTICE is hereby given that, in accordance with the provisions of the Act passed at the last session of the Legislature of Quebec, the said Company will be held at the office of the said Company, No. 180 St. James Street, Montreal, at 10 o'clock in the forenoon of
Tuesday, 10th day of February next
S. HONDU, Secretary.
 Montreal, 5th January, 1895.

Wm. Foster Brown & Co.,
 233 St. James Street.
TO RENT.
FINE STORE, WAREHOUSE OR FACTORY
 On St. James and Inspector Sts. Four Stores High.
 St. James street, 33 x 100 feet, floor area, 10,000 square feet, 13,000 square feet, 15,000 square feet, 17,000 square feet, 19,000 square feet, 21,000 square feet, 23,000 square feet, 25,000 square feet, 27,000 square feet, 29,000 square feet, 31,000 square feet, 33,000 square feet, 35,000 square feet, 37,000 square feet, 39,000 square feet, 41,000 square feet, 43,000 square feet, 45,000 square feet, 47,000 square feet, 49,000 square feet, 51,000 square feet, 53,000 square feet, 55,000 square feet, 57,000 square feet, 59,000 square feet, 61,000 square feet, 63,000 square feet, 65,000 square feet, 67,000 square feet, 69,000 square feet, 71,000 square feet, 73,000 square feet, 75,000 square feet, 77,000 square feet, 79,000 square feet, 81,000 square feet, 83,000 square feet, 85,000 square feet, 87,000 square feet, 89,000 square feet, 91,000 square feet, 93,000 square feet, 95,000 square feet, 97,000 square feet, 99,000 square feet, 101,000 square feet, 103,000 square feet, 105,000 square feet, 107,000 square feet, 109,000 square feet, 111,000 square feet, 113,000 square feet, 115,000 square feet, 117,000 square feet, 119,000 square feet, 121,000 square feet, 123,000 square feet, 125,000 square feet, 127,000 square feet, 129,000 square feet, 131,000 square feet, 133,000 square feet, 135,000 square feet, 137,000 square feet, 139,000 square feet, 141,000 square feet, 143,000 square feet, 145,000 square feet, 147,000 square feet, 149,000 square feet, 151,000 square feet, 153,000 square feet, 155,000 square feet, 157,000 square feet, 159,000 square feet, 161,000 square feet, 163,000 square feet, 165,000 square feet, 167,000 square feet, 169,000 square feet, 171,000 square feet, 173,000 square feet, 175,000 square feet, 177,000 square feet, 179,000 square feet, 181,000 square feet, 183,000 square feet, 185,000 square feet, 187,000 square feet, 189,000 square feet, 191,000 square feet, 193,000 square feet, 195,000 square feet, 197,000 square feet, 199,000 square feet, 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A Walk in a Coal Forest.

(BY SIR J. WILLIAM DAWSON.)

To enjoy such a walk it will be necessary to put back the clock of time some millions of years, and to fancy the continents on which we live in a very crude and unformed condition, and occupied by plants and animals very different from those of the present day. Our presence



J. W. Dawson

then and there will be a gross anachronism, and we can be permitted such a flight of fancy only on the basis of the knowledge of the conditions of that long-past time which we have obtained from laborious study of the vegetable and animal remains entombed in the rocks associated with our beds of coal; and from the attempt to realize these as they lived and grew in their day.

The writer of these pages was born and spent his boyhood on the coal-formation rocks, and his earliest collections were of fossil plants of the coal-formation. He has ever since been more or less occupied with Carboniferous fossils, and has through life been endeavoring to realize and to present to others the conditions of the world in that period, and the manner in which at that time great stores of fossil fuel were laid up to meet the wants of men in these later days.

The rocks of the great Carboniferous age, which contain the most important beds of coal, are very widely distributed on the continents of the Northern Hemisphere. Though they do not by any means everywhere contain productive beds of coal, yet they are the great homes of manufacturing industries, the "black country" from which so much of national wealth emanates. It is interesting also that it has pleased the Divine Ruler to give an exceptionally large share of this valuable geological formation to the English race. Great Britain and its Colonies, and its daughter the United States, possess between them the larger part of the productive coal deposits of the world, and on this fact their wealth and greatness have largely depended. We may therefore fitly select for our walk some part of the coal country in the familiar regions of Britain or the United States or Canada. Perhaps the coal fields of Pennsylvania and Ohio will serve our purpose as well as any other. At the time to which we shall transport ourselves, the black tenants of our coal cellars, whether Anthracite or Bituminous, were the living and verdant covering of a world so different from that in which we now live that if transported to it in the body, we might well imagine ourselves in another planet.

SCENE IN AN ANCIENT FOREST.

Let us, then, take up our position on some eminence where now the ridges of the Appalachian mountains of Pennsylvania rise. But we must remember that as yet this mountain range has not been born, for large portions of it are formed of the Carboniferous beds themselves, folded into long ridges and furrows, which at the time of our visit must have been flat, and must therefore have occupied a much greater breadth than they do now. Still even at this early period there were swelling uplands at least, forming a belt along the eastern coast of North America; and here in the first instance we may take our stand, to obtain a general view of the landscape and to accustom ourselves to the dense dank atmosphere of a time when the air was more loaded both with vapor and carbonic acid than it is at present.

Around us we see the ground covered with a dense growth of ferns and lycopods, above which tower groups of palm like tree-ferns, and here and there clumps of pines, some of them with leaves like those of our modern yews, other with broader fern-like or oval leaves, like those of the Ginkgo tree and Podocarpus of Japan and China. The vegetation is not unlike that of the uplands of New Zealand or of Australia, or, though the kinds of plants are different, approaching in its general effect to that of those sandy flats in Florida where groves of straggling pines tower over a profusion of the dwarf palmetto.

AN OLD TIME SWAMP.

But ascending the highest portion of the land within reach, and looking westward, we see before us an interminable flat, like one of the great prairies of the West; but low and swampy, like the Western "Muskegs," dotted with large ponds and covered not with short prairie grass, but with tall forests, or dense jungles of reed-like plants. Even when the mid-day sun shines mildly through the warm, close, misty atmosphere, this landscape presents no inviting appearance, and we might fear to enter it, not only as probably malarious, but as affording a very wet and treacherous footing, and a pathless and featureless wood in which any traveler might soon lose his way, while we know not what dangerous animals might lurk in its recesses. But let us make some little attempt, at least along the margin, where it borders on the more pleasant upland.

As we leave the more open ground and enter the forest, we are struck with the strange character of its trees, some of them of great size and towering height, but all quite different from any thing we have seen. They are obviously of many kinds, but to a botanical eye they soon resolve themselves into a few generic groups. One very abundant tree, represented by several species reminds us of the little ground-pine—*Lycopodium dendroideum* of our woods, which is not a pine at all, but a club-moss, and so are these its gigantic predecessors, the *Lepidodendra*. Their smooth round trunks are covered with scale-like bases of fallen leaves, arranged in spiral lines, and reminding one of the scaly skin of the fish. The stem forks above, then each branch forks, and forks again until they end in a multitude of slender branchlets, all covered with thin needle-like leaves, and bearing cones like those of pines or rather like those of our tiny club-mosses, for they are really flowerless plants allied to these, and bear minute spores instead of seeds. Some of the species have slender branchlets and small leaves and cones. Others have stouter branches with very long leaves like those of the Southern pitch-pine, and great cones either pendant on slender stalks or attached by the base to the branches, as in the red pine. If we happen to see the roots of one of these trees, which have been washed out by a stream, we shall find that, like the

branches above, they fork regularly, and that they are covered with great soft rootlets regularly arranged, as thick as a writing pencil, and of great length—a contrivance intended to enable them to grow in soft water-soaked soils, and in fact, resembling in its use the great root-stocks of our pond-lilies. Trees of this genius and of different species are very plentiful; and slender though their foliage is, make by their branching and close proximity a somewhat dense shade.

CURIOUS PLANT GROWTHS.

Allied to these *Lepidodendra*, or scale trees, are others still more grotesque, the *Sigillaria*, or stamped trees, which carry their old leaf-bases in vertical rows, sometimes placed on ribs which give the trunk a certain resemblance to a fluted column, though the flutings are not depressed but raised. These trees have the same curious stigmara roots with the others, and similar narrow leaves, but usually very long, and rise in tall pillar-like trunks either without branches or with a few thick branches at top. Their fruits of cone-like form, or in long spikes, are borne in whorls girdling the stem and branches. These are very abundant trees, of many species, often growing close together in dense groves and presenting an appearance so grotesque and unusual that their remains have been one of the greatest of botanical puzzles. Some of them we may see more than three feet in diameter and eighty feet or more in height.

Another type of tree of different form presents diverging branches, like an ordinary tree, but these are clothed with long and broad leaves having parallel veins like those of Indian corn and other endogenous plants. These trees are more woody in structure and their leaves are very firm and hard. They bear a singular kind of fruit in clusters or long racemes; each fruit or seed consisting of a little nut with a wing to waft it through the air, or in other cases a soft fleshy pulp, perhaps tempting to some animals. These trees, the *Cordaites*, of which there are several kinds with leaves of different sizes and shapes, are intermediate between the modern yews and the *Cycads*, or false sago plants of the tropics. They are gymnosperms, or naked seed plants, and in that group serve to fill up a great gap existing between the *Pines* and the *Cycads*. Here, however, as well as on the uplands, we find the pines, or at least yews, some of them with narrow, others with broad leaves, and all with true seeds or nuts like those of their modern allies, and with strong and durable wood, which, had there been bow-men in those days, might have served them with tough wood for the long bow like that of our English forefathers. These pines are in the modern world among the most widely diffused of trees, occurring in both hemispheres and in all climates, from the Arctic to the equatorial, and it is in accordance



with this that they appear very early in geological time, being found in the Devonian Period anterior to the Carboniferous, and in fact as far back as we know any proper trees at all.

TREE-FERNS.

Another familiar form, though not in our present climate, is that of the tree-fern. There are many kinds of these, some tall, graceful and stately, some short and dense, some recumbent on the ground like the palmettos of Florida, which, where the surface has been burned over, look like black serpents creeping on it. I imagine that some kinds at least of one very curious tree-fern must have been thus recumbent, though possibly others stood erect. The fern referred to (*Megaphyton*) has often a thick trunk, but with only two vertical rows of scars of great leaves on the opposite sides, so that it would seem to have borne only two large leaves at a time. These must, however, have been wide and spreading, so that the appearance of the tree might not have been ungraceful. It would seem that all of these tree-ferns had at the base great numbers of aerial roots descending like cordage to moor them to the soft ground. Huge masses of these roots are sometimes found at their bases, and constitute an equally effective though very different contrivance from that of the spreading roots of the *Stigmara*.

In some parts of these great swamps there are vast areas, like the cane-brakes of the South, thickly covered with the *Calamites*, which were gigantic predecessors of the mare's-tails of our swamps, sending up groups of tall cylindrical stems with joints at intervals from which radiated numerous branchlets with long needle-like leaves. Like the bamboos of the tropics, these often grew to twenty feet or more in height, and attained to diameters of six inches or more. They were much more strong and woody than the modern mare's-tails, as became their greater size, but their fructification seems to have been very similar to that of their modern allies. They often had creeping underground stems, sending off many erect branches into the air, and the larger stems were provided, like the ferns, with aerial roots.

Allied to them were more delicate plants, the *Asterophyllites* and *Annularia*.

Everywhere, in open spaces, small and beautiful ferns or club-mosses carpeted the ground, but in the denser woods it was cumbered with fallen trunks in all stages of decay and crumbling underfoot, while many of them, becoming hollow, afforded places of shelter to small reptiles, millipedes and snails, while not infrequently the unwary foot might disturb a large and venomous scorpion ready to plunge its sharp sting into the flesh of an intruder.

MONSTERS OF THE DEEP.

As we approach the ponds or lakes of this vast swamp, huge ungainly monsters as large as alligators, but in form and structure more resembling newts and their allies, scramble to the bank and plunge sullenly into the dark water, along the edges of which are numbers of smaller reptilian animals, some soft and slimy, others clad in shining and gaily colored armor. Could we launch a raft or canoe in one of the shallow lakes, we would see that these teem with life. In places they are clothed with brakes of *Calamites*. In others they are dense and green, with aquatic plants allied to *Salvinia*. Everywhere they swarm with small shell-fishes and minute crustaceans and in the clearer parts we can see shoals of small active fishes clad in brilliant scales and leaping to capture insects, or themselves pursued by hungry shark-like creatures armed with long and sharp spines to protect them against the teeth of the larger reptiles.

USES OF OLD FORMS OF LIFE.

To what end was this vast profusion of low forms of life, animal and vegetable, occupying the world for so vast ages that they would have seemed eternal to any intelligent beings contemplating it—a condition of the world unsuited to the highest forms of life, and presenting only an endless succession of growth, death and decay of forms of vegetable and animal life apparently without use and object. It was, however, one of the phases of that vast series of changes through which the earth was destined to pass in the great plan of the Creator and preparatory to its last and highest tenants.

In this last aspect we see its highest uses. The vast vegetable growth of the period tended to purify the air of its surplussage of poisonous gasses and to fit it for higher forms of life, while the continents were being gradually shaped into those more varied and perfect forms which they have now assumed. More than this, provision was being made for the wants of rational and inventive men to appear in the far future. All our great stores of coal, on which nations depend for their wealth and millions of men rely for subsistence and comfort, are the buried and carbonized remains of those old forests, which, had we seen them in their prime, we should have supposed to be but waste and loss. They stored up for our far distant time the light and heat of millions of years ago. So the Eternal One, to whom a thousand years are less than a day, has cared for the fleeting earthly life of his creature man.

J. WILLIAM DAWSON.

MONTREAL, CANADA, February, 1895.

Saving on Naval Coal Supply.

Commander Chadwick, of the Equipment Bureau of the Navy Department, has compiled some interesting figures which show that the department has saved over \$50,000 within the past sixty days by sending coals from the United States to the West Indies to supply our fleet in those waters. Secretary Herbert, as stated by him in an interview published in THE COAL TRADE JOURNAL, decided some time ago that the excellent coal found in the Southern States could be sent to South and Central American ports and supplied to our vessels at about one-half the retail price of coals furnished by local companies who enjoy practical monopolies.

The excellent character of many of these Southern coals was fully demonstrated by the tests that have been reported to Congress and published in the JOURNAL, and when Admiral Meade was ordered to Isthmian waters his log was so arranged that the fleet under his command could be met at certain ports by coal transports loaded with the products of our own mines. A contract was made for a large quantity of coal to be delivered by the Davis Coal & Coke Co., of West Virginia, on board Admiral Meade's ships at Trinidad. The contract price was \$3 85 per ton, the local dealers charging \$7.50. The department is advised of the arrival at Trinidad of the first transport, which guarantees the success of Commander Chadwick's plan and a saving of 50 per cent. in the cost of all coal to be consumed by our fleets in Central American waters.

The next experiment will probably be the shipment of coal to Colon, where the Government has been compelled to pay as high as \$11.00 a ton for coal furnished by the Panama RR. Co., in spite of the fact that the presence of our vessels there has usually been necessitated by the menace to the railroad company's property in times of the periodical local disturbances.

W. L. C.

High Prices for Coal in Bermuda.

The islands of Bermuda, lying far out in the Atlantic, are the eastern outposts of the Western world. It is to Hamilton, Bermuda, that in seasons of storm and tempest on the North Atlantic many steamers put in for coal. The recent storms on the Atlantic have made the demand for coal at Hamilton unusually great and it has been selling there as high as \$15 a ton. Even the British Government has been selling coal from its stores there to merchant vessels. In view of this fact, Captain James, of Hamilton, came up here recently and has chartered the steamer 'Czarina,' which he will load at Newport News with coal and take to Bermuda. He will take down 1,000 tons, which will cost him about \$2.00 a ton and \$3.00 a ton for transportation. The steamer 'Welhaven' is also loading with coal at Philadelphia for Bermuda. It is said that there are several steamers in the port of Hamilton which refuse to pay the high price charged for coal.

A courteous and convincing advertisement serves as a courteous and convincing salesman.

An Important Series of Articles.

We are now publishing a series of articles upon the coal trade of the United States, devoting one number of THE JOURNAL to the trade of some particular State, and intend having these articles follow each other as frequently as possible, say twice a month if the several topics can be prepared in that time.

We invite the attention of the wholesale dealers to these special numbers as advertising mediums with which to reach the trade in the States described. A copy will be sent to every "prompt-paying" coal dealer and steam-user in each State, rated M2 or better, according to the 'Blue Book.' A schedule of rates has been prepared and will be sent upon application. Those who saw our 136-page souvenir number need not be reminded that we can get up a pretty fine paper when we try. We shall make a strong effort to have every article in this series one of great interest and value to the trade, enlarging the paper for the time being to whatever size may be necessary to accommodate the subject matter.

To the retail dealers in the smaller cities, where we have no regular correspondent, we would say that we shall depend upon them to assist us to a certain extent in the preparation of descriptive matter of their respective cities and hope for a prompt response to the letters of inquiry which we shall send to them from time to time, as may be necessary. Those who have any suggestions to offer should write as soon as possible. The letters will be placed upon file, and when the time comes to describe their city the matter will be taken up.

Our next special will appear March 20th, and will be devoted to the State of Massachusetts. Communications and advertisements should be sent in at once.

Schuylkill Coal Exchange.

POTTSVILLE, FEBRUARY 28TH, 1895.

The following collieries drawn to return prices of coal sold in February, 1895, to determine the rate of wages to be paid, make the following returns:

North Mahanoy colliery, (P. & R. C. & I. Co.).....	\$2.23 ³
St. Nicholas colliery, " "	2.26 ³
Alaska colliery, " "	2.20 ⁴
Richardson colliery, " "	2.27 ³
Oak Hill colliery, Leisenring & Co.....	2.12 ⁹

Average \$2.22

The rate of wages to be paid for last half of February, 1895, and first half of March, 1895, is nine (9) per cent. below the \$2.50 basis.

Heat Value of Coal.

The question of the thermal value of different fuels is treated in a practical and satisfactory manner in an article by E. P. Reichelm in the 'American Machinist.' Taking as a common ground for comparison the theoretical number of heat units in equal weights of various fuels, and deducting the average loss by draught and other wastes he calculates the cost of the net available heat units according to the average price of the fuels considered, and tabulates the results.

A ton of coal of 2,000 pounds contains about 28,000,000 heat units, or 14,000 in each pound. Under ordinary conditions the loss by draught, radiation and the heating of surplus space is estimated at 80 per cent.; or 22,400,000 heat units per ton. This leaves available for actual work 5,600,000 heat units, and, assuming the cost per ton of coal to be \$4, the cost of 1,000,000 heat units would be 73 cents.

Advertising Fable.

Some sailors, whose ship had made but little progress towards the port whither she was bound, through want of wind, besought the Captain to allow them to throw out the ballast which was on board, in the hope that when the ship was lightened she would move faster through the water. No sooner was this done than the breeze sprang up, which in a few hours became a furious gale of wind, and the ship, deprived of the ballast which would have kept her steady, keeled over and all on board perished.—Æsop.

In the storms and stress of business, it sometimes seems that it would be wise to lighten the load of expenditures by cutting off the advertising.

Advertising is business ballast. It makes the business safe and steady. It is needed more in stormy times than when everything is smooth and easy.

Coal Royalties are Income.

The following decision has been made by the authorities at Washington, and instructions sent out to the internal revenue collectors in regard to income tax collections thereon:

"Leases on coal lands conveying the coal before the same is mined are real estate within the meaning of that term as used in the income tax law, and are subject to all the provisions contained therein. All royalty and rent from mines should be returned as income, as in the case of the rents from real estate."

You that have coal to sell,

Prepare to sell it now.

Advertise the fact in

THE COAL TRADE JOURNAL.

A Walk in a Coal Forest.

(BY SIR J. WILLIAM DAWSON.)

To enjoy such a walk it will be necessary to put back the clock of time some millions of years, and to fancy the continents on which we live in a very crude and unformed condition, and occupied by plants and animals very different from those of the present day. Our presence then and there will be a gross anachronism, and we can be permitted such a flight of fancy only on the basis of the knowledge of the conditions of that long-past time which we have obtained from laborious study of the vegetable and animal remains entombed in the rocks associated with our beds of coal; and from the attempt to realize these as they lived and grew in their day.



J. W. Dawson

The writer of these pages was born and spent his boyhood on the coal-formation rocks, and his earliest collections were of fossil plants of the coal-formation. He has ever since been more or less occupied with Carboniferous fossils, and has through life been endeavoring to realize and to present to others the conditions of the world in that period, and the manner in which at that time great stores of fossil fuel were laid up to meet the wants of men in these later days.

The rocks of the great Carboniferous age, which contain the most important beds of coal, are very widely distributed on the continents of the Northern Hemisphere. Though they do not by any means everywhere contain productive beds of coal, yet they are the great homes of manufacturing industries, the "black country" from which so much of national wealth emanates. It is interesting also that it has pleased the Divine Ruler to give an exceptionally large share of this valuable geological formation to the English race. Great Britain and its Colonies, and its daughter the United States, possess between them the larger part of the productive coal deposits of the world, and on this fact their wealth and greatness have largely depended. We may therefore fitly select for our walk some part of the coal country in the familiar regions of Britain or the United States or Canada. Perhaps the coal fields of Pennsylvania and Ohio will serve our purpose as well as any other. At the time to which we shall transport ourselves, the black tenants of our coal cellars, whether Anthracite or Bituminous, were the living and verdant covering of a world so different from that in which we now live that if transported to it in the body, we might well imagine ourselves in another planet.

SCENE IN AN ANCIENT FOREST.

Let us, then, take up our position on some eminence where now the ridges of the Appalachian mountains of Pennsylvania rise. But we must remember that as yet this mountain range has not been born, for large portions of it are formed of the Carboniferous beds themselves, folded into long ridges and furrows, which at the time of our visit must have been flat, and must therefore have occupied a much greater breadth than they do now. Still even at this early period there were swelling uplands at least, forming a belt along the eastern coast of North America; and here in the first instance we may take our stand, to obtain a general view of the landscape and to accustom ourselves to the dense dank atmosphere of a time when the air was more loaded both with vapor and carbonic acid than it is at present.

Around us we see the ground covered with a dense growth of ferns and lycopods, above which tower groups of palm like tree-ferns, and here and there clumps of pines, some of them with leaves like those of our modern yews, other with broader fern-like or oval leaves, like those of the Gingko tree and Podocarpus of Japan and China. The vegetation is not unlike that of the uplands of New Zealand or of Australia, or, though the kinds of plants are different, approaching in its general effect to that of those sandy flats in Florida where groves of straggling pines tower over a profusion of the dwarf palmetto.

AN OLD TIME SWAMP.

But ascending the highest portion of the land within reach, and looking westward, we see before us an interminable flat, like one of the great prairies of the West; but low and swampy, like the Western "Muskegs," dotted with large ponds and covered not with short prairie grass, but with tall forests, or dense jungles of reed-like plants. Even when the mid-day sun shines mildly through the warm, close, misty atmosphere, this landscape presents no inviting appearance, and we might fear to enter it, not only as probably malarious, but as affording a very wet and treacherous footing, and a pathless and featureless wood in which any traveler might soon lose his way, while we know not what dangerous animals might lurk in its recesses. But let us make some little attempt, at least along the margin, where it borders on the more pleasant upland.

As we leave the more open ground and enter the forest, we are struck with the strange character of its trees, some of them of great size and towering height, but all quite different from any thing we have seen. They are obviously of many kinds, but to a botanical eye they soon resolve themselves into a few generic groups. One very abundant tree, represented by several species reminds us of the little ground-pine—*Lycopodium dendroideum* of our woods, which is not a pine at all, but a club-moss, and so are these its gigantic predecessors, the *Lepidodendra*. Their smooth round trunks are covered with scale-like bases of fallen leaves, arranged in spiral lines, and reminding one of the scaly skin of the fish. The stem forks above, then each branch forks, and forks again until they end in a multitude of slender branchlets, all covered with thin needle-like leaves, and bearing cones like those of pines or rather like those of our tiny club-mosses, for they are really flowerless plants allied to these, and bear minute spores instead of seeds. Some of the species have slender branchlets and small leaves and cones. Others have stouter branches with very long leaves like those of the Southern pitch-pine, and great cones either pendant on slender stalks or attached by the base to the branches, as in the red pine. If we happen to see the roots of one of these trees, which have been washed out by a stream, we shall find that, like the

branches above, they fork regularly, and that they are covered with great soft rootlets regularly arranged, as thick as a writing pencil, and of great length—a contrivance intended to enable them to grow in soft water-soaked soils, and in fact, resembling in its use the great root-stocks of our pond-lilies. Trees of this genius and of different species are very plentiful; and slender though their foliage is, make by their branching and close proximity a somewhat dense shade.

CURIOUS PLANT GROWTHS.

Allied to these *Lepidodendra*, or scale trees, are others still more grotesque, the *Sigillaria*, or stamped trees, which carry their old leaf-bases in vertical rows, sometimes placed on ribs which give the trunk a certain resemblance to a fluted column, though the flutings are not depressed but raised. These trees have the same curious stigmata roots with the others, and similar narrow leaves, but usually very long, and rise in tall pillar-like trunks either without branches or with a few thick branches at top. Their fruits of cone-like form, or in long spikes, are borne in whorls girdling the stem and branches. These are very abundant trees, of many species, often growing close together in dense groves and presenting an appearance so grotesque and unusual that their remains have been one of the greatest of botanical puzzles. Some of them we may see more than three feet in diameter and eighty feet or more in height.

Another type of tree of different form presents diverging branches, like an ordinary tree, but these are clothed with long and broad leaves having parallel veins like those of Indian corn and other endogenous plants. These trees are more woody in structure and their leaves are very firm and hard. They bear a singular kind of fruit in clusters or long racemes; each fruit or seed consisting of a little nut with a wing to waft it through the air, or in other cases a soft fleshy pulp, perhaps tempting to some animals. These trees, the *Cordaites*, of which there are several kinds with leaves of different sizes and shapes, are intermediate between the modern yews and the *Cycads*, or false sago plants of the tropics. They are gymnosperms, or naked seed plants, and in that group serve to fill up a great gap existing between the *Pines* and the *Cycads*. Here, however, as well as on the uplands, we find the pines, or at least yews, some of them with narrow, others with broad leaves, and all with true seeds or nuts like those of their modern allies, and with strong and durable wood, which, had there been bow-men in those days, might have served them with tough wood for the long bow like that of our English forefathers. These pines are in the modern world among the most widely diffused of trees, occurring in both hemispheres and in all climates, from the Arctic to the equatorial, and it is in accordance



with this that they appear very early in geological time, being found in the Devonian Period anterior to the Carboniferous, and in fact as far back as we know any proper trees at all.

TREE-FERNS.

Another familiar form, though not in our present climate, is that of the tree-fern. There are many kinds of these, some tall, graceful and stately, some short and dense, some recumbent on the ground like the palmettos of Florida, which, where the surface has been burned over, look like black serpents creeping on it. I imagine that some kinds at least of one very curious tree-fern must have been thus recumbent, though possibly others stood erect. The fern referred to (*Megaphyton*) has often a thick trunk, but with only two vertical rows of scars of great leaves on the opposite sides, so that it would seem to have borne only two large leaves at a time. These must, however, have been wide and spreading, so that the appearance of the tree might not have been ungraceful. It would seem that all of these tree-ferns had at the base great numbers of aerial roots descending like cordage to moor them to the soft ground. Huge masses of these roots are sometimes found at their bases, and constitute an equally effective though very different contrivance from that of the spreading roots of the *Stigmata*.

In some parts of these great swamps there are vast areas, like the cane-brakes of the South, thickly covered with the *Calamites*, which were gigantic predecessors of the mare's-tails of our swamps, sending up groups of tall cylindrical stems with joints at intervals from which radiated numerous branchlets with long needle-like leaves. Like the bamboos of the tropics, these often grew to twenty feet or more in height, and attained to diameters of six inches or more. They were much more strong and woody than the modern mare's-tails, as became their greater size, but their fructification seems to have been very similar to that of their modern allies. They often had creeping underground stems, sending off many erect branches into the air, and the larger stems were provided, like the ferns, with aerial roots.

Allied to them were more delicate plants, the *Asterophyllites* and *Annularia*.

Everywhere, in open spaces, small and beautiful ferns or club-mosses carpeted the ground, but in the denser woods it was cumbered with fallen trunks in all stages of decay and crumbling underfoot, while many of them, becoming hollow, afforded places of shelter to small reptiles, millipedes and snails, while not infrequently the unwary foot might disturb a large and venomous scorpion ready to plunge its sharp sting into the flesh of an intruder.

MONSTERS OF THE DEEP.

As we approach the ponds or lakes of this vast swamp, huge ungainly monsters as large as alligators, but in form and structure more resembling newts and their allies, scramble to the bank and plunge sullenly into the dark water, along the edges of which are numbers of smaller reptilian animals, some soft and slimy, others clad in shining and gaily colored armor. Could we launch a raft or canoe in one of the shallow lakes, we would see that these teem with life. In places they are clothed with brakes of *Calamites*. In others they are dense and green, with aquatic plants allied to *Salvinia*. Everywhere they swarm with small shell-fishes and minute crustaceans and in the clearer parts we can see shoals of small active fishes clad in brilliant scales and leaping to capture insects, or themselves pursued by hungry shark-like creatures armed with long and sharp spines to protect them against the teeth of the larger reptiles.

USES OF OLD FORMS OF LIFE.

To what end was this vast profusion of low forms of life, animal and vegetable, occupying the world for so vast ages that they would have seemed eternal to any intelligent beings contemplating it—a condition of the world unsuited to the highest forms of life, and presenting only an endless succession of growth, death and decay of forms of vegetable and animal life apparently without use and object. It was, however, one of the phases of that vast series of changes through which the earth was destined to pass in the great plan of the Creator and preparatory to its last and highest tenants.

In this last aspect we see its highest uses. The vast vegetable growth of the period tended to purify the air of its surplussage of poisonous gasses and to fit it for higher forms of life, while the continents were being gradually shaped into those more varied and perfect forms which they have now assumed. More than this, provision was being made for the wants of rational and inventive men to appear in the far future. All our great stores of coal, on which nations depend for their wealth and millions of men rely for subsistence and comfort, are the buried and carbonized remains of those old forests, which, had we seen them in their prime, we should have supposed to be but waste and loss. They stored up for our far distant time the light and heat of millions of years ago. So the Eternal One, to whom a thousand years are less than a day, has cared for the fleeting earthly life of his creature man.

J. WILLIAM DAWSON.

MONTREAL, CANADA, February, 1895.

Saving on Naval Coal Supply.

Commander Chadwick, of the Equipment Bureau of the Navy Department, has compiled some interesting figures which show that the department has saved over \$50,000 within the past sixty days by sending coals from the United States to the West Indies to supply our fleet in those waters. Secretary Herbert, as stated by him in an interview published in THE COAL TRADE JOURNAL, decided some time ago that the excellent coal found in the Southern States could be sent to South and Central American ports and supplied to our vessels at about one-half the retail price of coals furnished by local companies who enjoy practical monopolies.

The excellent character of many of these Southern coals was fully demonstrated by the tests that have been reported to Congress and published in the JOURNAL, and when Admiral Meade was ordered to Isthmian waters his log was so arranged that the fleet under his command could be met at certain ports by coal transports loaded with the products of our own mines. A contract was made for a large quantity of coal to be delivered by the Davis Coal & Coke Co., of West Virginia, on board Admiral Meade's ships at Trinidad. The contract price was \$3 85 per ton, the local dealers charging \$7.50. The department is advised of the arrival at Trinidad of the first transport, which guarantees the success of Commander Chadwick's plan and a saving of 50 per cent. in the cost of all coal to be consumed by our fleets in Central American waters.

The next experiment will probably be the shipment of coal to Colon, where the Government has been compelled to pay as high as \$11.00 a ton for coal furnished by the Panama RR. Co., in spite of the fact that the presence of our vessels there has usually been necessitated by the menace to the railroad company's property in times of the periodical local disturbances.

W. L. C.

High Prices for Coal in Bermuda.

The islands of Bermuda, lying far out in the Atlantic, are the eastern outposts of the Western world. It is to Hamilton, Bermuda, that in seasons of storm and tempest on the North Atlantic many steamers put in for coal. The recent storms on the Atlantic have made the demand for coal at Hamilton unusually great and it has been selling there as high as \$15 a ton. Even the British Government has been selling coal from its stores there to merchant vessels. In view of this fact, Captain James, of Hamilton, came up here recently and has chartered the steamer 'Czarina,' which he will load at Newport News with coal and take to Bermuda. He will take down 1,000 tons, which will cost him about \$2.00 a ton and \$3.00 a ton for transportation. The steamer 'Welhaven' is also loading with coal at Philadelphia for Bermuda. It is said that there are several steamers in the port of Hamilton which refuse to pay the high price charged for coal.

A courteous and convincing advertisement serves as a courteous and convincing salesman.

An Important Series of Articles.

We are now publishing a series of articles upon the coal trade of the United States, devoting one number of THE JOURNAL to the trade of some particular State, and intend having these articles follow each other as frequently as possible, say twice a month if the several topics can be prepared in that time.

We invite the attention of the wholesale dealers to these special numbers as advertising mediums with which to reach the trade in the States described. A copy will be sent to every "prompt-paying" coal dealer and steam-user in each State, rated M2 or better, according to the 'Blue Book.' A schedule of rates has been prepared and will be sent upon application. Those who saw our 136-page souvenir number need not be reminded that we can get up a pretty fine paper when we try. We shall make a strong effort to have every article in this series one of great interest and value to the trade, enlarging the paper for the time being to whatever size may be necessary to accommodate the subject matter.

To the retail dealers in the smaller cities, where we have no regular correspondent, we would say that we shall depend upon them to assist us to a certain extent in the preparation of descriptive matter of their respective cities and hope for a prompt response to the letters of inquiry which we shall send to them from time to time, as may be necessary. Those who have any suggestions to offer should write as soon as possible. The letters will be placed upon file, and when the time comes to describe their city the matter will be taken up.

Our next special will appear March 20th, and will be devoted to the State of Massachusetts. Communications and advertisements should be sent in at once.

Schuylkill Coal Exchange.

POTTSVILLE, FEBRUARY 28TH, 1895.

The following collieries drawn to return prices of coal sold in February, 1895, to determine the rate of wages to be paid, make the following returns:

North Mahanoy colliery, (P. & R. C. & I. Co.).....	\$2.23 ²
St. Nicholas colliery, " "	2.26 ²
Alaska colliery, " "	2.20 ⁴
Richardson colliery, " "	2.27 ³
Oak Hill colliery, Lelsenring & Co.....	2.12 ³

Average \$2.22

The rate of wages to be paid for last half of February, 1895, and first half of March, 1895, is nine (9) per cent. below the \$2.50 basis.

Heat Value of Coal.

The question of the thermal value of different fuels is treated in a practical and satisfactory manner in an article by E. P. Reichelm in the 'American Machinist.' Taking as a common ground for comparison the theoretical number of heat units in equal weights of various fuels, and deducting the average loss by draught and other wastes he calculates the cost of the net available heat units according to the average price of the fuels considered, and tabulates the results.

A ton of coal of 2,000 pounds contains about 28,000,000 heat units, or 14,000 in each pound. Under ordinary conditions the loss by draught, radiation and the heating of surplus space is estimated at 80 per cent., or 22,400,000 heat units per ton. This leaves available for actual work 5,600,000 heat units, and, assuming the cost per ton of coal to be \$4, the cost of 1,000,000 heat units would be 73 cents.

Advertising Fable.

Some sailors, whose ship had made but little progress towards the port whither she was bound, through want of wind, besought the Captain to allow them to throw out the ballast which was on board, in the hope that when the ship was lightened she would move faster through the water. No sooner was this done than the breeze sprang up, which in a few hours became a furious gale of wind, and the ship, deprived of the ballast which would have kept her steady, keeled over and all on board perished.—Æsop.

In the storms and stress of business, it sometimes seems that it would be wise to lighten the load of expenditures by cutting off the advertising.

Advertising is business ballast. It makes the business safe and steady. It is needed more in stormy times than when everything is smooth and easy.

Coal Royalties are Income.

The following decision has been made by the authorities at Washington, and instructions sent out to the internal revenue collectors in regard to income tax collections thereon:

"Leases on coal lands conveying the coal before the same is mined are real estate within the meaning of that term as used in the income tax law, and are subject to all the provisions contained therein. All royalty and rent from mines should be returned as income, as in the case of the rents from real estate."

You that have coal to sell,

Prepare to sell it now.

Advertise the fact in

THE COAL TRADE JOURNAL.

Make in Cook's
Mar 1895

Gazette.

G. H. HOLLAND & SON,
DIRECT IMPORTERS OF
AMERICAN and ENGLISH
WALL PAPERS.
1758 & 1760 Notre Dame St.

MONTREAL, WEDNESDAY, MAY 24, 1893.

SUBSCRIPTION \$6 A YEAR--3 CENTS A NUMBER.

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Begin will ordain the Rev. A. Dorion to the priesthood at High Mass in the parish church. The young priest is a native of the parish, and as it will be the first ordination service that has ever been held in Charlesbourg, great preparations are being made for the event.

Captain Henry Pinhey has been appointed mechanical assistant inspector of weights and measures in Quebec division in succession to his father-in-law, the late W. C. Adams.

THE CRAIGSIDE'S LOSS.

Some Further Particulars of Her Foundering--Went Down Quickly.

HALIFAX, May 23.—Captain Anderson, First Officer Jeffers, Second Officer Webster and eighteen engineers, firemen and seamen, crew of the foundered British steamer Craigsid, arrived this afternoon in the steamer City of Ghent. The captain states that his ship struck what he is positive was a submerged wreck at midnight Friday last, eight miles southeast of Whitehead. As soon as the shock was felt the engines were stopped. The vessel commenced to take water fast, but as the stoke hold and engine room remained intact the order was given to start ahead again, but the engines had only made a few revolutions when the engineers and firemen were driven from their posts by the inrush of water into the stoke hold and engine room. There was soon over 10 feet of water in the hold and as it looked as though she would sink at any moment the crew all took to the boats and lay by till 5 o'clock Saturday morning, when the hatches burst off and the ship plunged under. Where she sank no bottom could be had with a thirty fathom log line. The men afterwards landed at Raspberry harbor. She had 2,900 tons of sugar in

DEATH CAME IN THE GALE.

A Number of People are Reported Killed in Ontario.

STRUCK MONTREAL HARD

But While Some Damage was Done No One was Killed—Four Men Killed in Cleveland.

TORONTO, May 23.—A most destructive tornado prevailed in Ontario to-day. Many towns and villages and a small portion of the country district have been heard from, and such destruction is never known to have occurred before. All frail structures went down before the wind, and many substantial ones were considerably damaged. The loss will reach into the hundreds of thousands. The casualties so far reported are few and include but two fatalities. At Perth, Washburn's circus tents were blown down and some ladies seriously injured. At Napanee, Frank Brooks, employed by Sir R. J. Cartwright, near Perry's Corners, was struck by lightning and killed. At Tilsonburg, another life was lost by the partial destruction of E. D. Tilson's oatmeal mill. The wind caught the west corner knocking out about fifty feet of that side and as much of the east side. Two men were on the bottom floor of the elevator, Henry Joyce and A. Snively. Joyce felt the wall giving away and rushed out of east door just as the mass of bricks fell and was struck on the head by the falling debris, being killed instantly. Snively escaped with slight injuries. When the wind had passed Broadway there were

caught this and carried the heavy planks of the scaffolding across the intervening buildings to Cathcart street, where, in falling, some of them broke the lower windows in the Victoria Rifles armory. The windows of the Turkish bath also suffered, and some chimneys were partly blown down. The Road department set a gang of men at work and cleared off the street, the southern side being blocked. The fence round the vacant lot at the corner of St. Catherine and University streets was blown in, and the handsome painted advertisement of the Queen's Opera company smashed to atoms. A tree on University street was also blown down and fences in the upper part of the city suffered considerably. On Dufferin square a quantity of bricks were carried from the gable end of a house and a tree was blown down. The telegraph and telephone wires and poles were broken, seven poles falling on Wellington street alone.

Drivers coming in from Lachine report considerable mischief along the lake shore. The water, already high, was driven up on the shore and boat houses suffered severely. The road was also flooded in a number of places. Green houses out by Cote St. Antoine also collapsed beneath the pressure of the wind, which, one observer's instrument showed was for a short time blowing as high as ninety miles an hour. On St. Paul street some boxes were lifted off a truck and falling broke a window, the driver almost following them through the glass. On Anderson street a large tree was torn from its roots and blown across the road.

A Bank Badly Damaged.

At the Banque du Peuple there was a narrow escape for the clerks who only saved their lives by rushing into the vault, the door of which was luckily open. During the past few days the building next door that of La Banque Nationale has been partially torn down, and when the crash of the storm came, the wall leading to the Banque du

CHEERED LORD SALISBURY.

The People of Ulster Give Him a Cordial Reception.

TALKS TO THEM STRAIGHT

And Tells Them That as Ireland Fought England's Battles so Will England Fight Theirs Now.

BELFAST, May 23.—Lord Salisbury was received with great enthusiasm to-day at Larne by the opponents of Irish home rule. Lord Salisbury, in responding to a Unionist address at Larne, said that if Great Britain should be hostile to Ireland or should even entertain that kind of friendship manifested by Sweden towards Norway—Mr. Gladstone's favorite instance of the advantages of home rule—then the sources of prosperity in Ireland would be dried up and the industries of Ulster would decay. He said that he desired earnestly to impress upon his hearers that all the blessings enjoyed through union depended on the vigor with which they now fought the enemy. Their present action would determine the destiny of Irishmen, Scotchmen and Englishmen for generations to come.

Upon his arrival at Belfast Lord Salisbury received an ovation. In replying to an address from the corporation Lord Salisbury briefly alluded to the wealthy enterprises of Ireland. No city, his Lordship said, had a deeper interest in maintaining a full connection with Great Britain.

The crowd in the streets was most enthusiastic. They unyoked the horses from the Lord Mayor's carriage in which

Bourinot
W. A. H. H. H.
1893

WISE MEN MEET AT OTTAWA

The Annual Gathering of the Royal Society of Canada.

An Address to the Earl of Derby—An Able Address by the President, Dr. Bourinot.

[From our own correspondent.]

OTTAWA, May 23.—The Royal society assembled here to-day, among those present being Sir J. W. Dawson, D. P. Penhallow, A. Johnstone, C. Clark Murray, Dr. G. P. Girdwood, professors of McGill university; L. W. Bailey, professor of Fredericton, N.B., university; A. H. Mackay, of Halifax, N.S.; Ramsay Wright, of Toronto university; Rev. Prof. Clarke, of Trinity college, Toronto; Dr. Burgess, superintendent of the Protestant Humane society, Montreal; J. M. Lemoine, Quebec; G. W. Hay, New Brunswick; E. J. Chapman, professor of Queen's university, Kingston; Dr. Geo. Stewart, Quebec, and G. F. Matthews, St. John, N.B. The first business of the morning was the report of the council, presented by Secretary Fletcher. Among other things the report stated Dr. Campbell, of Montreal, and Dr. R. W. Ellis, Ottawa, had been elected members of sections two and four respectively.

In view of the early departure of His Excellency the Governor-General from Canada, the following address had been prepared:—

To His Excellency the Right Hon. Sir Frederick Arthur Stanley, Earl of Derby in the Peerage of Great Britain, Knight Grand Cross of the Most Honourable Order of the Bath, Governor-General of Canada and Vice-Admiral of the same:

MAY IT PLEASE YOUR EXCELLENCY:—

1. Now that the time is approaching when Your Excellency will retire from the high position which you have filled with such signal advantage to this country, the Royal Society of Canada feel it incumbent upon them to express their warm appreciation of the genial sympathy which you have always extended to them and to their work, as well as their hearty thanks for the generous hospitality which they have received from yourself and the Countess of Derby.

2. It is with deep regret that the society have heard of the hours of trial through which Your Excellency has so recently passed. Whilst they offer you their sympathy on the decease of your eminent brother, they learn with satisfaction that the health of your son, after many weeks of severe illness, has been at last restored, and that here at least you have our consolation.

3. It has been more than once a matter of regret on the eve of the departure of a governor-general that the rule or usage which appears to govern the tenure of the office, has too suddenly withdrawn from this country men who, by the ability they have displayed in the discharge of their high functions, and the deep interest they have taken in every movement calculated to benefit this Dominion, have won for themselves the esteem and even the affection of the Canadian people of both races. One could wish a governor-general should be longer with us when he has had time to know

Joseph Howe, then printer and editor, published the first edition of the work of the only great humorist that Canada has yet produced, "The Clockmaker," in which Judge Haliburton created a "Sam Slick," a type of a down-east Yankee peddler, who understood "soft sawder and human natur." During this period, however, apart from Haliburton's works—for the judge was also the author of the best history of Nova Scotia—we look in vain for any original Canadian literature worthy of special mention. It was not to be expected that in a poor country, still in the infancy of its development, severely tried by political controversies, without any system of public schools, with a small population scattered over a long, narrow strip of territory from Sydney to Niagara, there could be any intellectual stimulus or literary effort except what was represented in such newspapers as the *Gazette* and the *Canadian* of Quebec, the *GAZETTE* of Montreal, or the *Nova Scotian* of Halifax, or found expression in the legislative halls or court rooms of a people always delighting in the displays there made of mental power and natural eloquence.

It was in the years that followed the concession of responsible government that a

NEW ERA CAME TO CANADA.

An era of intellectual as well as material activity. Political life still claimed the best energy and talent, and the names of Archibald, Baldwin, Brown, Cartier, Dorion, Galt, Hincks, Howe, Lafontaine, McGehe, Morin, McNab, John A. Macdonald, Alexander Mackenzie, Tilley, Tupper, Uniacke, Young, and of many others familiar to living Canadians, from Nova Scotia to Ontario, are associated with the most memorable and progressive period of Canadian history. The newspaper press kept pace in essential respects with the material progress of the country, and represented the average tone and spirit of the people. Public intelligence was more generally diffused; and according as the school and university system expanded, and the material conditions of the country improved, a literature of some merit and importance grew up. The poems of Cremazie, Howe, Chauveau, McLachlan and Sangster were imbued with a truly Canadian spirit—with a deep love for Canada, its scenery, its history and its traditions. In historical literature, Canadians have always shown some strength. In French Canada the names of Ferland and Garneau have received a proper recognition for their clearness of style and historic research. Since their days the same branch of literature has continued to enlist the earnest and industrious study of Canadians with more or less success, as the works of Dent, Casgrain, Sulte and Kingsford show. Of poets, since Cremazie and Sangster, we have had our full share; and it is satisfactory to know that the poems of Fréchette, Reade, LeMay, Dewar, Mair, Murray, Roberts, Bliss, Carman, Kirby, Wilford Campbell, Lampman and Machar, have gained recognition from time to time in the world of letters outside of Canada. The poems of Canadians take frequently an elevated and patriotic range of thought and vision, and give expression to aspirations worthy of men both and living in this country. Even Mr. Edgar has forgotten the politician and years of opposition in the poet, and given us a national song on this "Fair Canada of Ours." Public speakers have frequently cited passages from Roberts' inspiring verses, in which he echoes our national feeling:

"Shall not our love this rough, sweet land make sure? Her bounds preserve inviolate, though we die.

O, strong hearts of the North, Let flame your loyalty forth, And put the craven and base to an open

allowing every man and woman who had, or believed they had, some elementary scientific or other knowledge to enter its ranks; but its promoters did not think that could best subserve the special objects they had in view. At all events, none of them could have been influenced by any desire of creating a sort of literary aristocracy. Indeed, one would like to know how any one in his senses could believe for a moment that an institution of learning could be founded with exclusive tendencies in these times, in this or any other country. If there is a pure intelligent democracy anywhere it is literature. It may be aristocratic in the sense that there are certain men and women who have won great fame and stand on a pedestal above their fellows, but it was the world, not of a class but of all ranks and conditions, that has agreed to place them on that pedestal as a tribute to their genius which has made people happier, wiser and better, and delighted and instructed the artisan as well as the noble.

For twelve years then the Royal society has continued to persevere in its work; and thanks to the encouragement given it by the Government of Canada it has been able, year after year, to publish a large handsome

VOLUME OF THE PROCEEDINGS AND TRANSACTIONS

of its meetings. No other country in the world can exhibit volumes more creditable in point of workmanship than those of this society. The papers and monographs that have appeared embrace a wide field of literature—the whole range of archaeological, ethnological, historical, geographical, biographical, mathematical and physical subjects. The volumes now are largely distributed in Canada and are sent to every library, society, university and learned institution of note throughout the world with the hope of making the Dominion better known. The countries where they are placed for purposes of reference are these: The United States, every state of the Union and the District of Columbia, Newfoundland, Mexico, Brazil, Ecuador, Argentine Republic, Costa Rica, Uruguay, Guatemala, Venezuela, Chili, Peru, South Africa, Mauritius, India, Japan, Australia, New Zealand, Great Britain and Ireland, France, Spain, Italy, Germany, Russia, Greece, Roumania, Austria-Hungary, Norway and Sweden, Denmark.

So well known are these transactions that, when it happens some library or institution has not received it from the beginning or has been forgotten in the distribution, the officers of the society have very soon received an intimation of the fact. This is gratifying, since it shows that the world of higher literature and of special research—the world of scholars and scientists engaged in important observations and investigation—is interested in the work that is being done in the same branches in this relatively new country. It would be impossible within the limits of a single paper to give anything like an accurate and comprehensive idea of the numerous papers the subject and treatment of which, even from a largely practical and utilitarian point of view, have been of decided value to Canada. It could be honestly said, however, that the members of the society have endeavored to bring to the consideration of the subjects they have discussed a spirit of conscientious study and research, and that, too, without any fee or reward except that stimulating pleasure which work of an intellectual character always brings to the mind.

In these days of CRITICAL COMPARATIVE SCIENCE, when the study of the aboriginal and native languages of this continent has absorbed the attention of close students, the Royal society has endeavored to give encouragement to those

our schools and of some of our colleges may be likened to a veneer of knowledge and culture, which easily wears off in the activities of life, and leaves a good deal of the original and cheaper material very perceptible.

AS OUR LIBRARIES ARE SMALL

and confined to a few cities, so our public and private galleries of art are very few in number. In this respect Montreal is very much ahead of Toronto, which has no public collection, and very few good pictures even in private houses. While it is desirable that there should be brought to this country from time to time the best examples of artistic genius to educate our own people for better things, it is equally necessary, if not more so, that Canadians of wealth and taste should encourage the efforts of our own artists. Canadian art has heretofore been initiative rather than creative: but while we have pictures like those of O'Brien, Bell Smith, Brymner, Homer Watson, Lawson, Robert Harris, Pinhey, the Hamels, Huot, Jacobi, and of other excellent painters in oil and water colors, illustrating in many cases the charm and grandeur of Canadian scenery, and the picturesqueness of some varieties of Canadian life, it would seem only a little more encouragement is needed to develop a higher order of artistic performance among us. It is to be hoped that the same generosity which is building up commodious science halls and otherwise giving our universities larger opportunities for usefulness will also ere long establish at least one art gallery in each of the older provinces to illustrate not only English and foreign art, but the most original and highly executed work of Canadian painters. Such galleries are so many object-lessons—like that wondrous "White City" which has so suddenly arisen by a western lake—necessary to educate the eye, form the taste and develop the higher faculties of our nature amid the material and gross surroundings of our daily life.

THIS DOMINION OF CANADA,

said Dr. Bourinot in conclusion, possesses a noble heritage which has descended to us as the result of the achievement of Frenchmen, Englishmen, Scotsmen and Irishmen, who through centuries of trial and privation showed an indomitable courage, patience and industry which it is our duty to imitate with the far greater opportunities we now enjoy of developing the material and intellectual treasures of this fair land. In all probability the French language will continue into a far indefinite future, to be that of a large and influential section of the population of Canada and must consequently exercise great influence on the culture and intellect of the Dominion. It has been within the last four decades that the best intellectual work—both in literature and in statesmanship—has been produced in French and English Canada, and the signs of intellectual activity in the same direction do not lessen with the expansion of the Dominion. The history of England, from the day the Norman came into the island until he was absorbed in the original Saxon element, is not likely to be soon repeated in Canada; but, in all probability the two nationalities will remain side by side to an unknown period to illustrate on the northern half of the continent of America the culture and genius of the two strongest and brightest intellectual powers of civilization. As both of these nationalities have vied with each other in the past to build up this Confederation on a large and generous basis of national strength and greatness, and have risen to a superior

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THE GERMAN ELECTIONS.

The residence of Lord Londonderry. Salisbury journeyed to Newtown, ten miles from Belfast, where he was received at the County Down station, whence Lord enemies. The carriage was drawn to the residence of Lord Londonderry. Salisbury journeyed to Newtown, ten miles from Belfast, where he was received at the County Down station, whence Lord enemies. The carriage was drawn to the residence of Lord Londonderry.

Worded Manifesto.

Berlin, May 23.—The day takes a...

Victims of the Storm.

On Visitation street, Maxime Gros...

Four Men Killed at Cleveland.

Cleveland, Ohio, May 23.—A terrific...

A Girl Killed at Ottawa.

Ottawa, May 23.—A terrific thunder...

Aurora Suffers Somewhat.

Aurora, Ont., May 23.—At 11.45 this...

Christiansia, May 23.—Another Land-

slide has occurred at Vaerdalen, Norway...

It will be Fair and Cool To-day Say

THE PROBABILITY.

QUEEN'S WEATHER.

Metropolitan Office, Toronto, May 23, 11 p.m.—The storm centre which was...

THE SCHEME FOR REORGANIZATION IS

Assured at Last.

THE NORTHERN PACIFIC.

The plan of refunding the Northern Pa...

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THE GERMAN ELECTIONS.

The Centre Party Issues a Strongly

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...of or but... wheat...
 ...as a Canadian reading the newspaper...
 ...might add, by the weight of a big cheese. The
 ...real value of a country must be weighed in
 ...scales more delicate than the balance of trade.
 ...The measure of a nation's true success is the
 ...amount it has contributed to the thought, the
 ...moral energy, the intellectual happiness, the
 ...spiritual hope and the consolation of mankind.
 ...The lecturer then went on to review some of
 ...the most salient features of the

INTELLECTUAL PROGRESS OF CANADA

since the days Canada entered on its career of
 competition in the civilization of this contin-
 ent. So far there are three well defined eras
 of development in the history of the Dom-
 inion. First there was the era of French-
 Canadian occupation which has in many re-
 spects its historic and picturesque features.
 Then after the cession of New France to
 England came the era of political and con-
 stitutional struggle for a full measure of public
 liberty which ended in the establishment of
 responsible government about half a century
 ago. Then we come to that era which dates
 from the Confederation—an era of which the
 first quarter of a century only has passed, of
 which the signs are still full of promise, despite
 the predictions of gloomy thinkers, if Canadians
 remain true to themselves and face the future
 with the same courage and confidence that
 have distinguished the past.

In the daring ventures of Marquette, Joliet,
 LaSalle and Tonty, in the stern purpose of
 Frontenac, in the far-reaching plans of La
 Gallissoniere, in the military genius of Mont-
 calm, the historian of these later times has at
 his command the most attractive materials
 for his pen. But we cannot expect to find the
 signs of original intellectual development
 among a people where there was not a single
 printing press, where local freedom of thought
 and action was repressed by a paternal abso-
 lutism, where the struggle for life was very
 bitter up to the last hours of French supre-
 macy, in a country constantly exposed to war,
 and too often neglected by a king who thought
 more of his mistresses than of his harassed and
 patient subjects across the seas. Yet that
 memorable period of our history—days of
 heroic struggle in many ways—was the inspiring
 influence of a large amount of literature which
 we, in these times, find of the deepest interest
 and importance from a historic point of view.
 The English colonies during the same period
 cannot present us with any books which for
 faithful narrative, and in some cases for ex-
 cellence of style, can at all compare with those
 of Champlain, Lescarbot, Lagard, La Potherie,
 Boucher, Le Clercq, the Jesuit Relations or
 Charlevoix. These were not Canadian writers
 in the sense that they were born or educated in
 Canada, but still they were the product of the
 life, the hardships and realities of old Canada.
 —It was from this country they drew the in-
 spiration that gave vigor and value to their
 writings.

During the era of
POLITICAL AND CONSTITUTIONAL STRUGGLE
 under British dominion, the brightest and
 strongest intellect of the provinces found scope
 for its display in the legislature, and at no
 period of the political history of Canada were
 there more fervid, earnest orators than appear-
 ed whilst the battle for responsible government
 was at its height. The names of Nelson, Papi-
 neau, Howe, Baldwin, Robinson, Johnstone,
 Rolph, Mackenzie and Wilmot, recall the times
 when questions of political controversy and
 political freedom stimulated mental develop-
 ment among that class which sought and found
 the best popular opportunities for the display
 of their intellectual gifts in the legislature in
 the absence of a great printing press and a na-
 tive literature. It is an interesting fact that

...the crude efforts...
 ...the very hour of their death, by
 ...their writings and their influence, to make the
 ...society a Canadian institution, broad in its
 ...scope, liberal in its culture, and elevated in its
 ...aspirations. Without dwelling on the qualifi-
 ...cations of two men whose names are imperish-
 ...ably connected with the work of their lifetime,
 ...Dr. Bourinot went on to say that the result of
 ...the Montreal meeting was the establishment of
 ...a society which met for the first time at
 ...Ottawa in the May of 1882, with a membership
 ...of eighty fellows under the presidency of Dr.
 ... (afterwards Sir) William Dawson, and the vice-
 ...presidency of the Hon. P. J. O. Chauveau, a dis-
 ...tinguished French-Canadian who had won a
 ...high name not only in literature, but also in
 ...the political world, where he was for years a
 ...conspicuous figure for his graceful eloquence,
 ...his broad culture and his courtesy of manner.
 ...The society was established in no spirit of isola-
 ...tion from other literary and scientific men be-
 ...cause its membership was limited to eighty fel-
 ...lows who had written memoirs of merit or ren-
 ...dered eminent service to literature or science—
 ...a number subsequently increased to a hundred
 ...under certain conditions. On the contrary it
 ...asked for and has constantly published con-
 ...tributions from all workers in the same fields
 ...of effort, with the simple proviso that such
 ...contributions should be presented with the en-
 ...dorsement of an actual member, though they
 ...might be read before any one of the four sec-
 ...tions by the author himself. Every society,
 ...whether purely literary or historical or scientifi-
 ...c, was affiliated and its delegates were given
 ...every advantage at the meetings possessed by
 ...the fellows themselves except voting and dis-
 ...cussing the purely internal affairs of the Royal
 ...society.

SOME MISAPPREHENSION

appears to have existed at first in the public
 mind that, because the society was named
 "The Royal Society of Canada," an exclusive
 and aristocratic institution was in contempla-
 tion. It seems a little perplexing to under-
 stand why any objection could be taken to
 such a designation when the Queen is the
 head of our system of government and her
 name appears in the very first clauses of the
 act of union, and in every act requiring the
 exercise of the royal prerogative in this loyal
 dependency of the crown. As a fact, in using
 the title, the desire was to follow the example
 of similar societies in Australia, and recall
 that famous Royal Society in England, whose
 fellowship is a title of nobility in the world of
 science. Certain features were copied from
 the Institute of France, inasmuch as there was
 a division into sections with the idea of bring-
 ing together into each for the purposes
 of common study and discussion those men
 who had devoted themselves to special
 branches of literature and science. In this
 country, and indeed in America generally, a
 notable tendency is what may be called the
 leveling principle—to deprecate the idea that
 any man should be in any way better than
 another—and in order to prevent that it is
 necessary to assail him as soon as he shows
 any political or intellectual merit, and to pre-
 vent him, if possible, from attaining that men-
 tal superiority above his fellows that his indus-
 try and his ability may entitle him to reach.
 The Royal society suffered a little at first from
 this spirit of depreciation, which is often
 carried to an extent that one at times could
 almost believe that this is a country without
 political virtue or intellectual development of
 any kind. The claims of some of its members
 were disputed by literary aspirants who did
 not happen for the moment to be enrolled in
 its ranks, and the society was charged with ex-
 clusiveness, when as a fact it simply limited
 its membership and demanded certain qualifi-
 cations, with the desire to make that mem-
 bership a test of some intellectual effort, and con-
 sequently more prized by those who were al-
 lowed sooner or later to enter. It would have
 been quite possible for the society to make it-
 self a sort of literary and scientific picnic by

...the crude efforts...
 ...and romantic gush and twaddle, but must
 ...be such a judicial selection of the
 ...best Canadian talent as will evoke comparison
 ...with the higher class of periodicals abroad. In
 ...the meantime, until a magazine of this charac-
 ...ter is established, the transactions of the Royal
 ...society cannot be expected to occupy the same
 ...ground unless it is prepared to give up that im-
 ...portant field of original study and investigation
 ...which it and the societies with which it is affili-
 ...ated alone can fill in this country. In one re-
 ...spect, indeed, the Royal society can reach a
 ...much larger class of readers than it is now pos-
 ...sible by means of its somewhat formidable,
 ...though handsomely printed and well illus-
 ...trated, volumes which are neces-
 ...sarily confined, for the most part, to li-
 ...braries and institutions. By selecting
 ...a more convenient form, say large octavo, and
 ...printing in two volumes—the scientific sec-
 ...tions in one and the purely historical and liter-
 ...ary in another—a larger inducement will be
 ...given to the public to purchase its transactions
 ...at a moderate cost whenever, as so frequently
 ...happens, they contain monographs and essays
 ...in which Canadians generally are interested, or
 ...in which they wish special information. But
 ...whether this change be adopted or not, he
 ...was sure that the Royal society, by showing
 ...even still greater zeal and earnestness in the
 ...work for which it was founded, by co-operat-
 ...ing with scholars and students throughout the
 ...Dominion, by showing every possible sympa-
 ...thy with all those engaged in the work of art,
 ...culture and education, can look forward hope-
 ...fully to the future; and all it asks from the
 ...Canadian public at large is confidence in its
 ...work and objects, which are in no sense selfish
 ...or exclusive, but are influenced by a sincere de-
 ...sire to do what it can to promote historic truth
 ...and scientific research, and give a stimulus in
 ...this way to the intellectual development of this
 ...young Dominion yet in the infancy of its liter-
 ...ary life.

Dr. Bourinot then went on to say that with-
 out claiming for Canada any very remarkable
 results he thought on the whole there have
 been enough good poems, histories and essays
 written in the Dominion for the last four de-
 cades to prove that there has been a

STEADY INTELLECTUAL PROGRESS

among our people. Our intellectual faculties
 only require larger opportunities for their ex-
 ercise to bring forth a rich fruition. Our pro-
 gress in the years to come will be necessarily
 far greater than any we have yet shown, with
 the wider distribution of wealth, the dissemi-
 nation of a higher culture, and a greater con-
 fidence in our own mental strength and in the
 resources that this country offers to pen and
 pencil.

Largely, if not entirely, owing to the expan-
 sion of our own common school system—so ex-
 cellent in Ontario and still defective in Quebec
 —and the influence of our colleges and univer-
 sities in every province, the average intelli-
 gence of the people of this country is much
 higher than three decades ago. Speed in every-
 thing, however, is at once the virtue and the
 vice of this generation. The animating prin-
 ciple with the mass of people is to give a young
 man a business or a profession as soon as pos-
 sible, and the consequent tendency is to con-
 sider any education that does not immediately
 effect that end as superfluous. For one he still
 ranged himself among those who consider the
 conscientious and intelligent study of the an-
 cient classics—the Humanities as they were
 called—as best calculated to make cultured
 men and women, and as the noblest basis on
 which to build up even a practical education.
 The tendency is to get as much knowledge as
 possible by short cuts—to give a child too
 many subjects, and to teach him a
 little of everything. These are days
 of cheap cyclopedias, historical summa-
 ries, scientific digests, reviews of reviews—
 French in ten lessons, and interest tables.
 All is digested and made easy for the student.
 Consequently not a little of the production of

your money...

The worse your Catarrh, the more you
 need Dr. Sage's Catarrh Remedy. Its
 proprietors offer \$500 cash for a case of
 Catarrh in the Head which they cannot
 cure.

A Great Testimonial.

350,000

PIANOS AND ORGANS

Have been manufactured by Heintz-
 man & Co., Decker Brothers, J. & C.
 Fischer, Morris, Mason & Hamlin and
 Doherty & Co. Choice assortment
 on view at

C. W. Lindsay's Warerooms,

2270 ST. CATHERINE ST.,

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 payment. 123

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 (Late Argyropulo & Isherwood.)

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- H.I.H. The Czarevitch.**
- H.E.M. The Emperor of Japan.**
- H.E. The Prime Minister of Egypt.**
- H.E. The Governor of South Australia.**
- H.E. The Governor of Mauritius.**
- H.E. The Governor of Barbados.**

30 H B. Ms. WARSHIPS.
 147 " REGIMENTS, &c., &c., &c.

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FRASER, VIGER & CO.
B. GOLDSTEIN & CO.
 &c., &c., &c.

\$50,000 STG.

TO LEND at 5 per cent. interest, upon strictly
 first-class city properties, in sums of \$10,000
 and upwards.

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 interest mortgages.

A. G. ROSS & Co.,
 Standard Building,
 157 St. James street.

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and heavy thunderstorms in Ontario and Quebec and a westerly gale on the lakes. In the Maritime provinces the weather has been fair and cloudy, with cool northerly wind.

Minimum and maximum temperatures.—Esquimaux, 40, 60; Calgary, 35, 52; Edmonton, 38, 62; Prince Albert, 32, 60; Qu'Appelle, 28, 58; Minnedosa, 28, 50; Toronto, 47, 69; Montreal, 56, 74; Quebec, 44, 56; Halifax, 48, 62.

Lakes—Moderate to fresh winds; some light local rains, but for the most part fair and cool.

Upper St. Lawrence—Winds mostly westerly; fair and cool.

Lower St. Lawrence—Fresh to strong winds; clearing and cooler.

Gulf—Strong winds and gales; showery at first; afterwards clearing.

Maritime—Fresh to strong southwesterly, followed by cooler northwest winds; cloudy to fair weather, with local rains.

Manitoba—Fair and continued cool.

MONTREAL'S RECORD.

OBSERVATIONS TAKEN AT M'GILL COLLEGE OBSERVATORY ON MAY 23.

Time	Bar	Ther	Hum	Weather	Dir'n	Vel.
3.00	29.578	56.1	79	Bright.....	SE....	4
7.00	29.561	67.8	78	Overcast....	E.....	4
11.00	29.483	71.8	60	Cloudy.....	E.....	4
15.00	29.350	83.3	52	Cloudy.....	SE....	12
19.00	29.391	63.7	85	Rain.....	SW...	40
23.00	29.457	59.5	69	Cloudy.....	SE....	36

Height above sea level, 187 feet.
*Barometer reduced to sea level and to temperature of 32 Fahr.

†Humidity relative, saturation being 100.
Maximum temperature of the 23rd was 84.8.

Minimum temperature of the 23rd was 54.6.
Total mileage of wind on the 22nd was 536;
greatest in one hour, 24.

Rainfall on the 23rd was 0.14.

Arton Gets Twenty Years.

PARIS, May 23.—At the Assizes Arton, the Panama lobbyist, was sentenced in default to-day to 20 years' penal servitude for frauds in connection with the dynamite society and to five years' civil degradation and the payment of 400,000 francs fine for his unlawful and dishonest practices in his relations to the Panama Canal company.

An Iowa Bank Breaks.

TINGLEY, Ia., May 23.—The Exchange bank has suspended, and Robert Bennet, the cashier, has departed for parts unknown.

It is not what its proprietors say but what Hood's Sarsaparilla does, that tells the story. Hood's Sarsaparilla CURES.

where it landed with a crash that could be heard for blocks. Twenty men, under the direction of Jack Fleming, of the Gas company, were at work in the gutter. The mass of heavy timbers fell right in their midst, and those named were injured. A portion of the plate department of the Cleveland Rolling Mill company undergoing construction gave way at 9 o'clock with a fatal result. There were a number of men employed on the structure, two of whom were killed instantly, another received injuries which will prove fatal, and several more were badly injured. A two-storey frame house at the corner of Doan and Superior streets was blown down and John Cole was killed.

At Detroit.

DETROIT, May 23.—A terrific wind storm, accompanied by rain, broke over this city this morning. At 8 o'clock the wind suddenly rose to a velocity of 54 miles an hour and increased to 60 miles by 10.30 a.m. Many shade trees throughout the city were blown down and some streets rendered almost impassable. With few exceptions all telegraph and telephone wires running into Detroit are down. Doubtless there was a large amount of damage throughout Michigan and many wrecks must have occurred on the lakes.

At Other American Points.

ST. LOUIS, Mo., May 23.—A wind storm, blowing at the rate of 84 miles an hour, passed over this city last night doing great damage.

LOUISVILLE, Ky., May 23.—A heavy wind and rain storm struck this place at 4 a.m., blowing down and unroofing twenty or twenty-five houses in the eastern part of the city. Loss between \$25,000 and \$30,000.

IN AND AROUND THE CITY. Considerable Damage Done in Many Quarters—Several Serious Accidents.

The storm which so suddenly swept over the city about 5 o'clock yesterday afternoon was almost as disastrous in its effects as it was unexpected in its coming. From every quarter of the city details of damage by its fury have been received, whilst it is feared that the country districts have suffered severely.

During the storm the wind carried away a portion of the roof of the hotel St. Laurent, St. Lawrence street, just above Vitre, ripping it up like so much pasteboard. The falling debris wrecked the shooting gallery in the vacant lot adjoining. A large plate glass window in the building adjoining, over the lottery office, was blown out and scattered in fragments on the street. The Turkish Bath institute also suffered somewhat. An addition was being erected at the back part of the buildings. The wind

ship Edinburgh, the Windmill Point, broke near the middle of the river whilst a part of the roof on the Sincennes-McNaughton sheds were blown away as were some boards on the Allan sheds. The dust was flying so thickly that looking from the Harbor Commissioners' windows not a shed or ship was to be seen for several minutes, and when it did clear for a second men were seen clinging to the rails on the dyke to prevent their being blown over. The dust was so thick and cutting that many horses became frantic and bolted, whilst others remained still and refused to move. It was stated in the Harbor office yesterday that it was many years since a similar storm had visited the city, and that they never knew a storm to do so much damage in the short space of ten minutes as that of yesterday.

Done by the Storm.

Painters were engaged on the ceiling of the veranda of the Bonaventure depot when the storm struck, but the wind made splinters of their tackle and painted the sides of the depot in a very erratic manner. Several wings and windows were broken.

Chief Harrison's house at Cote St. Antoine was unroofed.

Frank White, master carter at the depot, was set on fire by a box of matches, and it took three carters and Constable Taylor to put out the flames.

McGill Observatory reports that the wind blew sixty miles an hour at the time the storm struck the city.

The roof of the Canada Lead and Saw works, on Ann street, was blown off.

Brother Arnold's school was slightly injured.

The coal elevator on the canal bank belonging to Mr. T. McCrory, was blown over, and some of the barges in the canal were loaded with debris.

Col. Hopkins, of Regina, N.W.T., who is staying at the Balmoral, was out in a boat at Lachine at the time, but seeing the storm coming made for shore. He says that he never saw the waves in Lake St. Louis so high, and he has known it since 1856. It was reported that a lady and gentleman had been drowned at Lachine, but this could not be confirmed. The waves were breaking over the wharf and railway track, and the Sovereign, being unable to land, set out for the rapids, but the storm was over before she reached them.

Edwin Booth to be Moved.

NEW YORK, May 23.—Edwin Booth will be removed as soon as his condition permits from the Players' club to the cottage of his son-in-law, Ignatius Grossman, at Narragansett, where it is hoped the sea air will hasten his convalescence.

fluence, was... at once. "During the present election concludes the letter, 'the cry 'reconcile them,' might well be repeated by men of all parties, in huts and in palaces.

FROM THE ORIENT.

The Big Passenger List of the Empress of India.

VANCOUVER, B.C., May 23.—The following is a list of the passengers by the Empress of India, which arrived to-day:—Hon. and Mrs. Astley, Mrs. Allen and child, Mr. Belt, Hon. O. Bridgeman, W. Bridgeman, J. Bellingham, G. Brinkwork, Mr. and Mrs. Bastian and two children, Mr. Berthune, Miss Butler, Mr. Blair, Mr. and Mrs. Castling, Mrs. Campbell, W. Campbell, Master D. Campbell, Major C. Collis Chaper, Miss Clagett, R. Crawford, General and Mrs. Calthorpe, Misses Cathorpe, Mr. and Mrs. Candler, Mr. Castle, W. Cope, Mrs. Dryden, Mr. and Mrs. Dixon and four children, Mr. Drew, Mrs. Drew, Miss Drew, Miss Dowd, Mrs. Daly, Miss Daly, Mr. Esmor, Miss Fane, Mr. Fane, Mr. Farer, Dr. K. Florenz, Mr. Guthrie and valet, M. Ginsburg, Mr. Gonin, Mrs. Ginter, Miss Ginter, Dr. Gray, Mr. Gellibrand, Miss Gellibrand, Rev. F. R. Graves, Dr. and Mrs. Hartigan, two children and maid, Mr. Heap, Rev. Mr. Harris, Mrs. Harrington, Major and Mrs. Hawkes, Mr. and Mrs. Harwood, Lieut. Hobbs, Rev. Mr. and Mrs. Herrington, two children and maid, Mr. and Mrs. Harvey and infant, Mr. Heilmann, Earl of Jersey, Countess of Jersey and maid, Mrs. R. J. Jones, J. L. Jensen, S. M. Knight, E. Kohnsperer, P. Kohnsperer, Mrs. Kothari, J. Kenworthy, S. P. Kenworthy, W. Kennedy, Mr. Lingo, J. Langhans, H. Lohgese, Mr. Langton, Mr. Lowe and valet, Mr. and Mrs. Mortimore, Mr. A. Molling, Captain N. Moore, Mr. M. S. Mehta, Captain McLeod, Captain Marshall, Rev. Mr. and Mrs. Moore and two children, Miss Mathews, H. E. Gent Massick, Mr. and Mrs. Macvicar, Mr. and Mrs. McLin and two children, Captain J. Morris and valet, Miss Newton, B. Neill, J. Nicol, Rev. William Owen, A. Fernton, Lieut. Pollard, Mr. Parvey, Mr. Prestly, Col. Parsons, A. Pond, Mr. Palamountain, Mrs. Roberts, Mr. Redpath, Col. Robinson, Mr. F. Robinson, Mr. Benni, Mrs. Slade, Mr. Slade, Mr. Smart, Mr. and Mrs. Stoddon, Miss Stoddon, A. E. Silk, Mr. Spence, W. Smith, Mr. Suermont, L. O. Smith, A. C. Schonburg, Justice and Mrs. Tottenham, Miss Tottenham, Rev. Mr. and Mrs. Taylor and two children, Lady Victoria, Mr. Wieler, Mr. Wark, P. Warburg, Mr. Willet, Lord Grey de Winton and valet.

More Trouble at Hull.

LONDON, May 23.—The striking Hull dockers caused disturbances yesterday. Two non-union men were beaten unconscious by union men. The police were stoned when they interfered and had a hard struggle before they rescued the two men.

Peterboro Cheese Market.

PETERBORO, Ont., May 23.—On the cheese board to-day 1,193 boxes were offered. Mr. Warrington bought fifteen factories for 9½c, and four factories at 9¼c.

McLeod Resigns from Boston & Maine.

BOSTON, Mass., May 23.—A. A. McLeod to-day resigned as president of the Boston & Maine Railway company.

or else leave
position be occupied.

Hon. Mr. ALLEN moved the reading of the bill, "An Act further to amend the Act respecting fishing by foreign vessels." He said that the amendments were in the direction which the experience of the past few years had shown to be highly necessary for the preservation of our sea coast fisheries, and the suggestions would commend themselves to the members on both sides of the House. The convention of 1818 was the basis of all our legislation for the protection of our sea coast fisheries. By it the United States renounced their right to take dry or cured fish on or within three miles of any of the coasts, bays, creeks, or harbours of Her Majesty's Dominion in America, with the exception of certain parts of Labrador or Newfoundland and the Magdalen Islands where they were permitted to fish and land for the purpose of curing and drying fish. With this special exception, however, they also renounced the right forever to enter any one of our bays or harbours except for four purposes—for shelter, repairing damages, buying wood or obtaining water, and these privileges were only to be exercised subject to such restrictions as might be necessary to prevent the abuse of any one of them. The lapse or termination of the treaty of Washington had now relegated the question of the fisheries to the position in which it originally stood under the convention of 1818, the Imperial Act and our own statute laws. The effect of the bill now before the House will remove the difficulty of proving that a vessel buying bait is preparing to fish within the three mile limit. Under this enactment, if an American vessel comes into one of our harbours, bays or creeks and purchases bait, it will be liable to forfeiture.

Hon. Mr. HOWLAN regretted that the state of affairs between the United States and Great Britain rendered it necessary to pass an Act of that kind. The difficulty of interpretation that now remained between the United States and Great Britain is with regard to the treaty of 1818. Whilst England holds that the interpretation of that treaty with regard to the three-mile line is from head land to head land, the United States contend that it is only from the coast itself. The great source of irritation at the present time was the question of bait. He thought the solution of the question was simple. It was true that the Government of Canada had taken the power to license, and to forbid, as the case might be, the catching of fish.

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... a victory for
 ... five wickets. W. G. Grace
 ... the ball bowled, and Abel made
 110 and W. W. Reed 69 for Surrey, while
 for Gloucestershire F. Townsend scored
 106.

ROYAL SOCIETY.

**Final Meeting Yesterday Afternoon—
 Election of Officers and Other Pro-
 ceedings.**

The final and winding up meeting of the Royal Society of Canada took place in the committee rooms of the House of Commons yesterday. Some interesting papers were presented, among others one "On some Marine Invertebrata from the Pacific Coast of Canada," by J. F. Whitaves. This paper is a systematic list, with critical notes, of the species of corals, brittle-stars, starfishes sea urchins, brachiopods, mollusca and fishes dredged or otherwise collected by Dr. G. M. Dawson last summer in the Strait of Georgia, Discovery Passage, Johnstone Strait and Queen Charlotte and Quatsino Sounds, so far as they have been determined. A hundred and sixty one species have been recognized up to date, of which one starfish and fourteen molluscs are new to the Vancouver district, while two of the latter are new to science. The writer also stated that Prof. Sidney J. Smith (of Yale College) had kindly promised to report upon the crustacea collected by Dr. Dawson, but that the MS. of his paper, which is intended to be also a resume of the present state of our knowledge of the crustacea of the Pacific Coast of Canada, had not yet been received. After the reading of this a paper on "Illustrations of the Fossil Fishes of the Devonian Rocks of Canada, part 1," by J. F. Whitaves, was read. This part, which is the first of a series, contains more detailed descriptions than have yet been published, accompanied with illustrations of some of the remarkable fossil fishes of the Upper Devonian rocks of Scaumenae Bay, P.Q., collected by Messrs. R. W. Ells, T. C. Weston and A. H. Foord, of the Geological Survey of Canada. A number of other interesting papers were read, among which was "The Lost Atlantis," by Dr. Daniel "Secumseh," by G. T.

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other fish by traps, bag nets and
other destructive means, which have
proved so disastrous with the American
inshore fisheries. He thought that the
question would settle itself if the Govern-
ment would only forbid the use of traps or
other such instruments in Canadian
waters. In consequence the large Ameri-
can fishing vessels could not come in and
get their bait fresh—unlike the state of
affairs prevailing hitherto. The powers
given by the bill were very great, and he
hoped that the men chosen to command
the armed schooners, were seamen of
coolness and prudence. He also expressed
a desire to have the question settled
by a commission which could decide as to
the merits and demerits of the treaty of
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Hon. Mr. SCOTT expressed the pleasure
it afforded him last year to see American
fishermen allowed to fish in our waters
after the lapse of the treaty. He thought
it unwise to pronounce upon the interpreta-
tion of the treaty of 1818 in order that
Canadians would not prejudice the case, with
the slightest degree. He trusted that the
results of the labours of the commission
which must be inevitably appointed, would
be the finality of such a delicate and em-
barrassing question.

Hon. Mr. ALEXANDER, in a lengthy
and erratic speech, assailed Sir John,
whom he termed as being no longer a
responsible man.

Hon. Mr. PLUMB called him to order.

The hon. gentleman from Woodstock
finally withdrew his expression and
apologized, but desired to proceed.

Hon. Mr. POWER said that the Ameri-
can people regarded the action of the
Government in giving up a season's
fishing as an admission of weakness and
an admission that the fisheries were no
longer deemed of great value. He thought the
conclusion assumed by the Dominion
that all through was too

Wilson; "Man's
Denison; "The Wilderness
Canada," by Dr. Withrow; "Caractacus,
"Malcom and Margaret," by Dr. A. E.
McD. Dawson; and "Some Prehistoric
Remains in Manitoba," by C. N. Bell,
communicated by J. G. Bournot.
Several other papers of considerable in-
terest were read, after which a general
meeting took place.

THE ELECTION OF OFFICERS.

By an unanimous vote, the very
Dr. T. E. Hamel, rector of
Laval University, Quebec, former vice-
president, was chosen president of the
association for the ensuing year. This
was an exceedingly popular election, as
the reverend gentleman has not only
demonstrated his ability as a scientist
but also has advocated some of the most
advanced ideas of Canadian unity and
loyalty to the mother flag. For vice-
president, Dr. Geo. Lawson of Halifax,
was elected, Mr. J. G. Bournot being
re-elected honorary secretary, and Dr. J.
H. Grant, honorary treasurer.

Some discussion was raised as to
whether vacancies should be filled by a
vote of the section in which the vacancy
occurred or by a vote of the whole soci-
ety, a matter which was not entirely set-
tled. At the conclusion of the general
meeting a meeting of the Council took
place, at which the president-elect, Rev.
Dr. Hamel, took the chair.

MRS. J. R. BOOTH.

The wife of Mr. J. R. Booth, one of the
most esteemed and prominent
died yesterday afternoon.

the difficulty that the advantages shared by the new members are the result of sacrifices on the part of the old, for which the latter are not indemnified. It consequently results that the associations refuse to admit new members, and in good times employ regular workmen hired for wages and liable to dismissal, and thus in the moment of success such associations lose the essential characteristics of co-operative societies.

To meet these difficulties Schulze recommends:—

1. The admission not only of members of the trade, but, as sleeping partners, of persons who, without taking any share in the industry of the association, are yet willing to venture a deposit of capital; and of workmen who enter the association at once, but, as they cannot be employed at once, remain for the time being as wage-laborers under other employers.

2. The participation of new members in the profits only after a certain lapse of time.

3. The application of borrowed capital, and not of the society's shares, to the acquirement of such real property as is required; such borrowed capital not being reclaimable before a certain date, but receiving interest.

4. Withdrawal from the association to be subject to as long notice as possible.

As to division of the profits, most German associations agree with Schulze, that, after the reserve fund has been duly considered, five per cent interest should be added to each business share; that then half the surplus should go to swell the shares as super-dividends, the other half being divided as bonus among all the workmen and officials according to the amount of salary they have received during the year.

It is very difficult to obtain accurate information respecting co-operative undertakings for productive purposes, as, from reasons of trade, such associations are very reticent with regard to their working.

In the report of the German Co-operative Union for 1884, 145 productive associations are mentioned under the following divisions:—

21	Cabinet and instrument makers' associations.	“
17	Spinners and weavers'	“
13	Millers and bakers'	“
11	Booksellers and printers'	“
10	Tailors'	“
7	Butchers and slaughterers'	“
7	Brewers'	“
6	Cigar-manufacturers'	“
6	Carpenters, builders, and stonecutters'	“
5	Metal-workers'	“
5	Spirit and brandy distillers'	“
5	Shoemakers'	“
5	Clockmakers'	“
24	Miscellaneous	“

The same report gives statistics of 10 associations which made a net profit of 5.5 per cent, allowing of a dividend of 13.6 per cent, as against 16.0 per cent in 1883, and 13.5 per cent in 1882. Whether this dividend is paid to the members in money down or not does not appear. Of the working capital of these societies, 36.4 per cent was their own.

Herr Borchet is the only authority who believes that the workmen's participation in the profits has prevented strikes.

The most conspicuous examples of co-operation in production are the Berlin Brass-Work Company, the Windhoff Foundry at Lingen, Möller's engine-works at Kupferhammer, Keilpflug's cigar-factory in Berlin, and the cotton-mills at Hasel.

Of all co-operative enterprises in Germany, the people's banks are the most developed and the most successful, and they appear to have in a great degree overcome the indebtedness and misery which were so often the lot of the working-classes a quarter of a century ago, in consequence of the usurious interest that they were compelled to pay, especially in agricultural districts, on even the smallest loan.

The main principles on which these banks are founded are again those of Schulze-Delitzsch. They are:—

1. The loan-seekers are themselves the directors of the institution established for the satisfaction of their needs, and share the risk and the profit.

2. The transactions of the association are based throughout on business principles: the fund of the association pays to the credit-

ors, and the loan-takers pay to the fund of the association bank, interest and commission, according to the rates in the money-market. The managers, especially those who have charge of the funds, receive remuneration according to their services.

3. By full payment once for all, or by small continuous contributions on the part of the members, shares in the capital of the association are formed, according to the amount of which the profit is divided, and placed to their credit till the full normal sum is reached, by which means an ever-growing capital of its own is acquired for the business of the association.

4. By the entrance fees of members and by reservation of shares, a common reserve fund is accumulated.

5. Sums further necessary for the complete carrying-on of the business are borrowed on the common credit and security of all the members.

6. The number of members is unlimited. Entrance is open to all who satisfy the requirements of the statutes, and it is free to any one to cease to be a member after giving due notice.

Not only artisans and manufacturers, but also others, especially agriculturists, merchants, and dependent workmen, avail themselves of these banks, and they have maintained and strengthened themselves in the confidence of the public through all crises.

The Giro-Union ('Circulation Union') of German associations deserves special notice. An account is opened at the Associations' Bank in Berlin in favor of each people's bank belonging to the Union. Each bank keeps a deposit of at least 300 marks there, which can be increased by deposits in specie, by bills on Berlin or any Prussian bank, or places where there are other loan associations, or by the transference of the deposit of a third party from his account to their own: it can, on the other hand, dispose of its deposit by transference to another account, kept by the bank, or by checks, bills payable at sight, or ordered consignment in specie. Though Schulze regarded this institution as extremely important, only a minority of the people's banks belonging to the general union belong to it also.

The number of people's banks belonging to the general union was 1,961 on Jan. 1, 1885.

Co-operative societies for educational purposes would appear not to exist in Germany, where educational facilities in every branch of learning are already amply provided for, and within the reach of the poor; but co-operative associations of various kinds often provide educational, social, and recreative facilities for their members.

Societies for building dwellings for the poorer classes have met with but little success in Germany. They appear to have succeeded best in Alsace; and one at Flensburg, in Jutland, founded in 1878, possesses, according to the report of 1884-85, 19 houses, with a value of 100,000 marks, and 800 members, one of whom has the sum of 87,000 marks to his credit in the society's books.

The formerly wide-spread system by which pasture-land, forest, fisheries, etc., were held in common, has almost entirely ceased to exist in Germany, in consequence of recent legislation. On the other hand, a movement has taken place, chiefly under the same auspices as the co-operative movement on the Schulze-Delitzsch principle, by which combination now plays a very important part in German agriculture.

Dairy co-operative associations have been started in all directions. There are further associations for the purchase and use of agricultural machines, the members paying a certain sum for the use of the common property, and associations for cattle-breeding, sheep-farming, hops, vegetable, and vine-insurance, and kindred objects.

THE STONE AGES IN TUNIS.

AN interesting report on the relics of prehistoric man in the region of Tunis appeared in the May number of the well-known scientific periodical, the *Matériaux pour l'Histoire Primitive et Naturelle de l'Homme*. The author, Dr. R. Collignon, deputed by the Anthropological Society of Paris for this purpose, spent three years in traversing the country in every direction, and in making the observations and collections which are described in this report. Only the principal results can here be noticed; but these, it will be seen, are of great scientific value.

The most important observations were made in the district about

Gafsa, a considerable town in the southern part of the regency, preserving the site and the name of the Roman Capsa. The author describes three remarkable hills, which rise to a moderate elevation in the neighborhood of that town. These hills, having been made posts of observation of the occupying army, are now known as Posts I., II., and III. Post I. is an eminence rising on one side, by a gradual slope, to a height of sixty metres (about two hundred feet) above the level of the town, and descending on the other side in a steep, cliff-like face, of forty-two metres, to an upland plain. This precipitous face offered to the investigator the advantages of a cutting, showing the composition of the hill from base to summit. It proved to be, in the greater part, a limestone conglomerate, in which are embedded small particles of quartz, with rolled flint-stones of various sizes, and fragments of brown silex. Geologically, the hill belongs to the earliest period of the quaternary or pleistocene epoch. The lower half is of stone sufficiently compact to be quarried for building-stone. Above this is a layer, about eighty feet thick, of somewhat looser and more friable conglomerate, with larger embedded stones. And this, again, is surmounted by a stratum of yellow travertine, about six metres (twenty feet) thick, containing no flints.

The remarkable fact is, that throughout the conglomerate were discovered relics of human handiwork, in the shape of wrought flints embedded in the rock. Still more remarkable is the fact that in the lower and harder stratum these relics were all of one sort, while in the upper and looser layer that sort had disappeared, and other kinds had taken its place. In the lower stratum he found specimens of that rude tool — the rudest of all tools — which is described sometimes as the 'drift-implement,' sometimes as the 'axe of St. Acheul,' and by Prof. G. de Mortillet, in his noted work 'La Préhistorique,' as the 'fist' (*coup de poing*), — a stone clipped into an ovoid or almond-like shape, and intended evidently to be grasped at the smaller end and used in pounding or hacking. With these were some of the coarse flakes, or clipped fragments, which usually accompany them. These stone fists and flakes were all in the typical forms which distinguish the work of the earliest quaternary race, — variously known as the 'River-drift,' or 'Canstadt,' or 'Chellean' race, — and were the only traces of human industry found in that stratum.

In the looser stratum above, not one of the ovoid implements was found, though a single specimen was extracted just on the line of division between the two layers. All the worked flints in the upper layer belonged to what M. de Mortillet styles the 'Mousterian' type, but were mostly of a heavy, coarse, and worn appearance. They were of various shapes, — triangular points, thick blades, rude scrapers, and the like. Dr. Collignon is of opinion that the implements in the upper conglomerate stratum were a development of those in the lower; but the facts, as described by him, do not seem decisively to bear out this opinion. Finally, in the highest stratum of all, the travertine, as has been said, no flints of any kind were found. The hill known as Post III. resembles that of Post I., except that it is lower, and that the layer of travertine is wanting.

The necessary conclusions from these facts, as set forth by the author, are, that in the earlier part of the quaternary era this region was inhabited by the race or races of men who formed these implements. During a period of great but unknown length the land gradually sank, and was finally covered by the sea. When it again rose above the surface, the currents swept away nearly all the formation which had accumulated during this subsidence, leaving only a few hills, such as have been described, to indicate the original level.

After this denudation, a new but briefer subsidence took place, giving rise to a new formation, and followed by a new elevation. These facts are shown by the evidences displayed in and around another hill, known as Post II. This is one of the 'foot-hills' of a small mountain-chain which sinks gradually into the plain at a little distance north of Gafsa. Around these hills and on their declivities are scattered many small mounds of clayey loam. These mounds rest on a layer containing many coarse Mousterian implements, exactly similar to those in the upper conglomerate of Post I. Above this layer is a stratum of argillaceous earth, between three and four metres thick, containing no flints. Then follows a thin layer or film of earth, about four inches thick, full of flint implements of every description. This layer clearly indicates what was for a considerable

period the inhabited surface. Above this layer are a few feet of earth; but the same implements are scattered profusely over the present surface, and are found below it where the soil is furrowed by the rains. They belong to every one of M. de Mortillet's 'ages,' subsequent to the Chellean and the earlier Mousterian; viz., the upper (or later) Mousterian, the Solutrean, the Magdalenian, and the Neolithic. So far as prehistoric Tunis is concerned, Dr. Collignon is satisfied that no distinction in point of time can be made among these different industries. It is clear, also, that they have continued in existence to a very recent period, since the soil which covers some of the Roman constructions holds flint implements of the same description.

A very curious fact, ascertained by Dr. Collignon, is that all these stone implements, of every age, are restricted to a comparatively narrow area in the south and west of Tunis. While they abound in that district, they are almost entirely absent from the northern and eastern portions of the country. Dr. Collignon does not attempt to explain this phenomenon. It may possibly be due to an early condition similar to that which exists at present in parts of our own continent, where two hostile races, like the Eskimo and the Athabaskan Indians, are separated by a wide space of unoccupied land.

It should be mentioned that in the middle of the Tunisian territory there is a limited area, quite distinct from that in which the stone implements occur, where megalithic monuments — dolmens and covered passages — abound. In one locality no less than four hundred dolmens were counted. These monuments Dr. Collignon believes to have been the comparatively late constructions of an intrusive tribe; and he is further of opinion that the descendants of this tribe and of the stone-implement makers still live in their respective districts, and are distinguishable by their very different physical traits. In the district of the dolmens the people are of rather low stature (1.63 metres, or about 5 feet 4 inches, — an average which must be understood as including both sexes), with long heads (index 74), and a visage short, broad, and irregular, closely resembling in outline that indicated by the Cro-Magnon crania. On the other hand, the people of the south of Tunis are comparatively tall (1.69 metres, about 5 feet 6 1-2 inches), very dolichocephalic (index 73), with retreating forehead and chin, and projecting glabella and brows; the nose turned up, and the lips thick, but with no prognathism. They are neither negroid, Berber, nor Arab. In his view, they represent the earliest ethnic stratum of the existing population, and preserve the blood and the type of the people who dwelt in this region during the stone ages.

The positive conclusions which we seem authorized to draw from Dr. Collignon's report may be stated in a few words. They are, first, that the human race is of an immense antiquity, dating back to the beginning of the quaternary age; and, second, that the first race of men, judged from the relics of their industry, were of a very low grade of intelligence, little surpassing that of the most sagacious brutes; but how far this apparent defect of intellect was real, and how far it may have been due to the circumstance, that, as M. de Mortillet has suggested, the faculty of speech was yet undeveloped, is uncertain. Finally, it is plain that the period of this earliest stone age was of a vast duration, which can only be expressed in geological terms. The same may be said of the early Mousterian era, which perhaps formed part of the first age. As for the various so-called 'stone ages' which followed, it seems impossible to make any real distinction of periods among them. They all apparently form one modern epoch, not of very great duration, and not yet closed.

CHILLED ARMOR FOR LAND-DEFENCES.

THE Gruson Works of Buckau-Magdeburg have recently published a book of some size, written by Engineer von Schuetz, in which the system of construction of chilled cast-iron armor for use in the protection of earthworks and in the making of turrets for land-batteries, as devised by Dr. H. Gruson, some years ago, is described at length, and an account is given of the results of the experiments which have been made, from time to time, by several European governments, to determine its efficiency in resisting the impact of the heaviest modern ordnance. This work has been

ARCHAIC ROCK SCULPTURES IN GALLOWAY.

(By Sir Herbert Eustace Maxwell.)

"Three things are necessary for a geologist, said Sir Charles Lyell, 'the first is—to travel, the second is—to travel, and the third is also—to travel.' It is not quite correct to say that the reverse is the case with the archaeologist, but it is the case that much more good is done by patient observation and record of the traces of past ages in a single district than by flying about all over the habitable globe. It is in consequence of laborious investigation confined to restricted localities, carried on by numerous observers, and the conscientious description of apparently trifling remains, that we are enabled from our arm-chair to 'survey the world from China to Peru,' and work out the problems which the collation of prehistoric relics from opposite hemispheres presents to us.

The more completely comparative study in this field is carried out, the more conclusive is the evidence that, in its primitive condition, the human race, encountering the same necessities, conceiving the same desires, exposed to similar dangers from wild animals or the forces of nature, has been wont to meet them by the same expedients. The writer has long before the two stone cells, of shape and weight almost identical, one of them ground down a piece of hard lower Silurian sandstone many ages ago by one of its predecessors in possession of part of the soil of Scotland; the other, shaped only a few years ago by a West Australian bushman out of a lump of metal-work, these two ignorant of the art of metal-work, these two barbarians, at an untold distance of time, each shaped a cutting instrument of stone which presented a strikingly similar appearance.

Mr. Taylor has drawn in language in his work on "Primitive Culture" on the similarity with which the arts of war, agriculture, and the chase, of religion, amusement, and decoration took form among barbarous tribes of all ages; but many problems remain unsolved, most of them arising from the fact that, in the various countries, in various seasons, it may not be thought sufficient to present to your readers a description of one of the puzzles which, so far, have baffled the acumen of archaeologists.

It has long been known that all over a very large part of the globe there exists a class of rock sculptures of a uniform type. Groups of cup-shaped depressions, generally connected with each other in a manner apparently arbitrary by grooves in the rock, and surrounded by one, two, three, or more concentric circles, constitute the usual design of these rude carvings. In India, in Central Europe, Scandinavia, and Great Britain they have been identified; while in North America they almost precisely identical have been described by Mr. Charles Rau in some observations published by the Geological and Geographical Survey, under the Department of the Interior.

As it is difficult to describe the character of these sculptures without diagrams, the accompanying sketches are given to show the strong likeness which exists between those of the three great continents. Fig. 1 is from the Temple of Chandeshwar, in India; Fig. 2, from a rock-surface at Auchinbreach, Argyleshire; and Fig. 3, from the Bald Friar Rock, in Maryland. Similar markings on rocks in Brazil have been described in a paper printed in the last volume of the proceedings of the Society of Antiquaries of Scotland. Besides these more elaborate forms there are cup marks, sometimes alone, generally in groups connected; in some instances, with grooves, still more frequently interspersed among the concentric circles. Those of Brittany and Ireland seem to merge into more advanced and elaborate designs, but it is difficult to determine whether the older and simpler sculptures have not been worked into a more artistic design by a later artist.

Fig. 1—Mahadesw symbols engraved on stone slabs in the Temple of Chandeshwar, India.

Fig. 2—Figures on rock-surface at Auchinbreach, Argyleshire.

Fig. 3—Sculptures on Bald Friar Rock, Maryland.

Careful drawings have been made under the direction of various archaeological societies of those sculptures of this class which have been found in various parts of England, Scotland, and Wales, identified within the last two years none had been brought to light.

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said to be not improbable, and is forcibly suggested by the position of the sculptured rock next to be described. Almost the whole of Wigtownshire is composed of lower Silurian rock, with bands, bosses, and dykes of igneous rock, severely ground down and scored by the movement of the great ice-field which at one time was piled over the entire surface of North Britain. Intractable as is this rock, and few as are the attractions it offers to the sculptor, it possesses this advantage that, owing to its hardness it for a very long period, provided it is not splintered by frost. Thus not only may the striae of ice-action, but also the individual strokes of the rude graving tools employed by primitive artists, be traced with almost as much distinctness as if they had been wrought a few years ago.

In the parish of Mochrum there is a ridge called Drumtradden, which means in the Erse or Gaelic speech (which ceased to be spoken about 300 years ago in this district) *drum tradden*, or the ridge of the combat. Three immense boulders, measuring from 10 to 12 feet in height, are set up on end on the summit of the ridge, very probably commemorative of a notable conflict, or of the braves who fell therein. Besides these "crannogs" or lake dwellings, intermediate between the site of the mound and the mountain stones, which lie about 300 yards apart, there is a grassy knoll, with points of grey rocks protruding. Some workmen, engaged on quarrying road-metal, commenced a few weeks ago to strip the turf from the knoll, when it became apparent that the whole of the mound was covered with figures. Some of which are represented on a highly magnified scale in Fig. 4. Their resemblance to those of other parts of the world, as described above, will at once be recognised. Only a few of the rock surface has been exposed as yet, as the tenant might not unreasonably object, to the excavation of a sweet bit of pasture, but no fewer than seventy-five or more of them are circled with one, two, or three rings, and connected with straight or slightly-curved grooves, have been laid bare. The turf grew to the depth of from 4 to 10 inches above them; not peat or moss, but hard loam. The formation of which, as exposed and thoroughly drained, is exceedingly soft. After the sculptors had deserted the rock, grey lichens would take possession of it in course of years; then grains of earth and sand blown in would gradually accumulate; for which stone crops (*sedum acre* and *in vacuo*) would establish themselves, followed by a drought-enduring plants, until at length sufficient vegetable mould had accumulated to sustain heather and the various grasses after which the formation of soil would proceed regularly, but still very slowly.

Similar experiments made by Sir James gave the same results. "On the hard granite slab, Mr. Robert Paul, the director of the Museum of Scottish Antiquaries, has inscribed a circle, seven in diameter, with three concentric wooden circles within it, and a wooden rod, and it is much to be desired that a wide ledge of the existence of this class of sculptures should be discovered in many of the various localities, when found, a description may be prepared and forwarded to the nearest scientific society.

CLYDE NAVIGATION TRUST.

The monthly meeting of the Clyde Navigation Trust was held in the Building, Glasgow, yesterday—Lord Provost M'Queen presiding.

The LORD PROVOST said that on the occasion of the meeting he had the pleasure of attending the chair, he would avail himself of the opportunity to refer to the various matters which had been discussed, and to the various resolutions which had been passed. He would not enter into the details of the proceedings, but would merely mention the principal points which had been discussed. He would first refer to the report of the committee on the proposed extension of the Clyde Navigation Trust. He would then refer to the report of the committee on the proposed extension of the Clyde Navigation Trust. He would then refer to the report of the committee on the proposed extension of the Clyde Navigation Trust.

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THE FAIR AT ONCE ANSWERED 'MAHADEO'.

A similar figure with a radial line began in the center, and received the same meaning of these figures, Mr. Campbell learned from a friend that they are called stones in Kangra (Punjab) by people who are ignorant of their origin. The fact is certainly, to say the least, (3).

It appears significant, no doubt, but carries enthusiasm, we hesitate to accept the suggestion put forward by Rivett-Carnie, that these cups, circles, and radiating lines wherever they occur represent conventionally the organs of genes. We prefer to wait in the meantime, until the accumulating evidence will lead to a solution of a problem which at present is as dark as at one time involved in Egyptian hieroglyphs and British omens.

One thing at least is certain, that in country these carvings reach back to a very antiquity. Those found on rocks in situ generally beneath a depth of soil, must have taken a considerable period to accumulate, while others, being cut on the surface of burial-places of the bronze period, are of that date, at least, must be of a date anterior to the time when the use of iron was introduced. It is difficult to say how these sculptures are to be explained, but it is not unreasonable to suppose that they were made by the same people who made the other sculptures of the same period. It is difficult to say how these sculptures are to be explained, but it is not unreasonable to suppose that they were made by the same people who made the other sculptures of the same period.

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the chief consideration being to have it as near its work (that is, as near the *Feeder* as possible, it does not follow that that will be near the *Organ*, see 7 b and c.). Where there is a room under the *Organ* this will do well for reception of *Engine*, or it may occupy any space at back of *Organ*; if the *Instrument* be raised on a *Platform* sufficiently high to allow *Bellows* to be placed beneath (as so strongly advocated by the author (see *Dep. of GEN. ARR.*), the *Motor* may

press it. It is abundantly evident that the *Education Act* will not work well in this country until the members of the *School Boards* are themselves educated; and technical education cannot be expected to progress as it should, until our children are taught the elements of natural knowledge. It is remarkable that out of sixty-eight members who voted against Sir J. Lubbock's motion no one said a word against it, with the exception of Mr. D. Davies, who thought that elementary science should be taught as an extra provided for by voluntary subscription, and Lord G. Hamilton, the member of the Government who would have the responsibility of carrying it out. The latter showed, in a really ludicrous manner, how utterly he failed to grasp the bearing of the motion; and if the House itself were not lamentably ignorant of elementary science, portions of his speech would have produced a very widely broadening smile. Lord George stated that, to accept the motion, it would be necessary to remodel the whole of the code, and then asking the question, "What was natural science?" he said, "it was very well for the hon. baronet to say that he did not mean anything difficult; but at the rooms of the Royal Society, which was established for the promotion of natural science, he found lectures had been delivered in biology, chemistry, natural history, mechanics, astronomy, mathematics, and botany." It is, perhaps, not a matter for wonder that the official obtuseness which imagines the Royal Society to be a sort of school, should reject Sir J. Lubbock's motion because the "subject was so wide that teachers might give instruction in almost any conceivable subject, and unless the House was prepared to add very largely to the educational expenditure, it would be impossible to add natural science to the subjects taught." We have no doubt that Lord George Hamilton made his extraordinary statement in perfect good faith, and really believed what he said; but before next session it is to be hoped some judicious friend will relieve his mind as to the "responsibility" which he seems so much afraid of, and induce him to adopt the proposal of Sir J. Lubbock. Mr. Forster gave him the lead by saying that it would be desirable to place the teaching of elementary science alongside of grammar, geography, and history, and his refusal to adopt that expression of opinion is only explicable on the assumption that Lord G. Hamilton believes the proposal to be impracticable.

THE AGE OF THE EARTH.

IN a paper entitled "Notes on Physical Geology," which was read during the last session of the Royal Society, the Rev. Prof. S. Haughton, M.D., endeavoured to furnish a geological proof that the changes of climate in past times were not due to changes in the position of the pole, and by way of a sequitur he gives reasons for believing that the whole duration of geological time may be a minimum of two hundred millions of years. The various points of the hypothesis are worked out in a manner that might be expected from the Professor's well-known erudition and skill, and his conclusions will undoubtedly bear a great deal of criticism, and will require some convincing arguments to upset them—at all events,

so far as regards his geological proof that changes of climate were not caused by changes in the position of the pole. The minor limit of geological time is deduced from the following considerations:—If the localities of the Arctic fossil remains are examined, and their relations to the position of the present North Pole carefully considered, we can demonstrate, says Prof. Haughton, that the hypothesis of a shifting pole (assuming it possible mechanically) is inadmissible to account for changes in geological climates, and that the pole has not sensibly shifted its place during geological periods. That being so, the conclusion follows of necessity that geological climates are due to the combined cooling of the earth and sun, and, on comparing the rates of cooling of the earth with the maximum measured thicknesses of its several strata, Prof. Haughton finds a remarkable proportion between them, leading to the conclusion that the maximum thicknesses of the strata are proportional to the times of their formation; whence he obtains the data from which he deduces the 200,000,000 years. Fossils of animals and plants now tropical, or which required for their existence a minimum temperature far in excess of that prevailing in high latitudes within the historical period, are found in various parts of the Arctic regions, and in such positions that it is impossible to explain their occurrence by any change in the position of the earth's axis. M'Clintock found in Prince Patrick's Island, latitude 76° 20', tropical fossils of Ammonites, Monotis, Pleurotomaria, and Nucula, while Sir E. Belcher, at Exmouth Island, and Capt. Sherard Osborne, at Bathurst Island, found respectively fossils of Ichthyosaurus and Teleosaurus. The latter was a reptile closely resembling the gavial of India, which is found nowhere outside the tropics, and requires warmer water than the alligator which flourishes in the neighbourhood of New Orleans, where the mean annual temperature is about 68° Fahr. But reptiles, which we know required such a climate as is represented by those figures, lived in the Jurassic period within 900 miles of the North Pole, where the mean annual temperature is now little above 1° Fahr. Species of Nautilus, Ammonites, Ceratites, and other mollusca have been found fossil in the Triassic beds of Spitzbergen in latitude 79°, while Ammonites, Belemnites, Pleuromya, and Monotis have been found in the Jurassic and Triassic beds near Cook's Inlet, Alaska, latitude 60° N. Prof. Haughton says that it is not possible to explain the occurrence of tropical animals in those three localities by any change in the position of the earth's axis, and he proves his statement by drawing a great circle joining Spitzbergen with Cook's Inlet. This circle passes nearly through the North Pole, and, in order to give a tropical climate to the places named, the pole must be displaced at right angles to the great circle along the meridian of 117° E., nearly that of Peking. The difference of latitude between Spitzbergen and New Orleans is 45°, so that, to make the Arctic regions tropical, the pole would require to be shifted to about 300 miles north of Peking. The South Pole would then have occupied a position about 1,000 miles to the S.S.E. of Valparaiso and the Chilean Andes, where Jurassic strata have been found in latitude 34° S., containing the tropical Ammonites biplex, which is also found in Alaska and in South Austria. That latitude would, however, be within 700 miles of the South Pole, if the earth's axis were shifted as suggested, and the occurrence of Jurassic ammonites in the Chilean Andes is therefore, according to Prof. Haughton, proof that the earth's axis of rotation cannot have changed, even if it were possible that it could change to the extent required.

Regarding now the climate of the Arctic regions during the Miocene tertiary period, there is abundant evidence to show that the northern parts of America and Europe-Asia had a nearly common forest vegetation with a temperate climate. The lignite beds which indicate the existence of this vegetation are found in Greenland, Grinnell Land, Spitzbergen, Alaska, and Mackenzie River, between the parallels of 60° and 82° N. The genus Sequoia (redwood) is represented in all those localities, and one species is very near the Californian representative which flourished during cretaceous times in North America, and still lives in California. In the miocene beds of Spitzbergen two species of Libocedrus are found, one of which is still living in California, while the other is found in the Chilian Andes. Other genera discovered in Alaska and Spitzbergen show, according to Prof. Heer, that the mean annual temperature could not have been much less than 48° Fahr., whereas the existing temperature of those places is little, if anything, above zero. To give them a sub-tropical climate it is found, by drawing a great circle joining the Mackenzie River and Spitzbergen, that the pole must be moved, at right angles to the arc, away from Greenland through 30°, when it will be found to have reached a point close to Yakutsk, within 800 miles of the Peninsula of Kamschatka and the Island of Saghalien. But those places contain miocene coal-beds requiring a climate which must have been impossible if the pole had so shifted. It is safe, therefore, on such evidence alone to conclude that the earth's axis of rotation has not shifted its position, and that the changes of climate have been brought about mainly by the cooling of the earth. The fossils found in Arctic regions afford no evidence of any cooler climate having prevailed there, although many proofs exist of warm and even high temperatures in those regions; accordingly Prof. Haughton gives us a thermometrical scale of the earth's life, which commences with 212°, boiling water, and its next stage is 122°, the temperature at which albumen coagulates. The interval between those corresponds to the azoic rocks, and that between 122° and 68° (the triassic and jurassic periods), to the palæozoic rocks. The neozoic rocks are represented on the scale by the interval between 68° and 48° Fahr., the miocene tertiary period. These temperatures are sufficiently well marked by the stories of the rocks, for until the temperature had been reduced below that of boiling water no stratified rocks could have been formed, and no life could have existed until the heat ceased to be sufficient to coagulate albumen. The plants and animals found in the Arctic regions are self-registering thermometers, and the present temperature we know by experiment, so that the successive epochs are indicated with tolerable accuracy. The rate of cooling of the hot earth suspended in cold space is not known, but the law of such cooling is; and, by calculating with the proportions of the intervals above mentioned, Prof. Haughton finds that the following represents the percentage value or duration of the three periods:—

Azoic (212° to 122°) ...	33
Palæozoic (122° to 68°) ...	41
Neozoic (68° to 48°) ...	26

Taking now the best table that can be procured of the thicknesses of the various strata in Europe, and converting the maxima into percentages, they coincide, when compared with the percentages found from the theory of a cooling globe, in a remarkable manner. Thus, calculated from the thickness of strata, the Azoic period is represented by 34·3 per cent., the Palæozoic by 42·5 per cent., and the Neozoic by 23·2 per cent. The remarkable coincidence of

these figures tends to justify the principle supported by many geologists—that the proper relative measure of geological periods is the maximum thickness of the strata formed during those periods. Carrying the calculation further down—that is to 32° Fahr. (the climate of Labrador), the percentage number between 48° and 32° Fahr. is found to be 32, a result so important that Prof. Haughton deduces from it the following propositions:—1. A greater interval of time now separates us from the miocene tertiary epoch than that which was occupied in producing all the secondary and tertiary strata from the triassic to the miocene epoch. 2. The enormous interval of time that separates us from the miocene epoch affords ample opportunity for the development of the gigantic mammals which are commonly supposed to have suddenly made their appearance on all our continents and disappeared as suddenly. Prof. Haughton concludes that the present condition of the earth's surface is profoundly different from its condition in the geological periods when climates depended chiefly on the internal heat of the earth, and not on that of the sun. That last sentence appears to contain the basis of Prof. Haughton's theory, and if we agree that the temperature so far from rising and falling, fell steadily until it reached 0° Fahr., the phenomena of the fossil fauna and flora of the Arctic regions are satisfactorily accounted for. It will be seen that the fact, that a much colder climate than exists in Britain once prevailed here, does not touch the question, because those changes of climate occurred in geological periods when temperature depended upon the sun and not upon the internal heat of the earth. The age of the earth Prof. Haughton fixes by taking the mean rate of denudation of large river basins, that is, about one foot in 3,000 years, which would, considering the proportion of sea to land, silt up the sea-bottoms at the rate of a foot in 8,616 years. Then admitting that the manufacture of strata proceeded at ten times that rate in geological times, or one foot in 861·6 years, and multiplying by the maximum thickness of the stratified rocks (177,200ft.) we obtain 152,675,000 years, to which must be added one-third at least to bring in the period from the miocene tertiary to the time when the Parry Islands and Greenland had a temperature of 32° Fahr. We have thus a minimum of two hundred millions of years as the whole duration of geological time. It will be seen that the paper is an elaboration of the views expressed by Prof. Haughton at the last meeting of the British Association, and it will be interesting to hear what geologists and physicists will say to the "proofs" since brought forward.

THE ORGAN: A COMPREHENSIVE TREATISE ON ITS MANUFACTURE, PROCURAL, AND LODGMENT.*

BY JOHN WATSON WARMAN,
Associate of the College of Organists, London.

PART I.—GENERAL TREATMENT IN MANUFACTURE.

[19, a] THE actual Location of the Hydraulic Motor is not a matter of very much moment. It is so very quiet and clean in its nature that it may—supposing there be no leakage, or what little there is properly led off—be placed almost anywhere, in the very drawing-room itself, if desired. One of Forrester's Engines (Duncan's Patent) was in 1874 (and exists to present time, so far as I know) placed thus, under a glass case, and caused no trouble. Certainly a drawing-room ornament in the shape of an Hydraulic Engine can command the merit of novelty.

b. Almost any nook or convenient place, therefore, may be used for the Water Motor;

* All rights reserved.

THE LATE FRESHET.—The *Truro Sun* enumerates the damages which was sustained in Colchester by the late freshet:— *H. J. J. J.*

The bridge on the Lower Village road, near the Albion Mills, was carried away by the pressure of ice and water, and when this gave way the new dam in course of construction was also considerably damaged, entailing a loss to the owner, Mr. John Black, of some \$290.

What is called the Board-landing bridge, was at first reported damaged, but the damage is now said to be very little. A small schooner lying near it was upset and very much wrecked.

At Crowe's Mill, Onslow, the carriage shed was carried away.

At Tatamagouche, Lackerby's Bridge, quite a large structure, was carried away. The bridge at Waugh's is also gone. Two schooners were forced from their moorings at Campbell's wharf and carried by the ice on the flats, and were considerably chafed and damaged.

At the Riversdale Mills the dam and the old Mill, together with a large lot of logs were carried down stream, the damage being very considerable.

In the Stewiacke River the freshet was very extensive, the largest since the one recorded in Mr. Miller's brook. The large bridge at Pembroke is demolished. Creelman & Co's Mill at Upper Stewiacke, was damaged to the extent, it is thought, of \$200. One half of the River bridge is carried away. Middle Stewiacke bridge is totally destroyed. The bridge at Chaplain's is also destroyed. Large lots of timber carried on to the meadows, and much time and labor will be lost in getting it to the river again. The fencing on the intervals was washed away in large quantities. Many cellars near the river were filled with water. At the residence of Mr. John Oakes the wood pile was aflort.

We have heard it reported that a bridge on Chiganoise river was carried down stream into a mill dam.—*Truro Sun 9th*

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lower part of the 18 foot bed, and at a distance from the other of considerably over 10 miles.

These lignites, therefore, while superior to many which are used in other parts of the world, are somewhat inferior to the best class of lignite coals found on the line of the Union Pacific Railway, the best of which contain from 45 to 53 per cent. of fixed carbon, and which occur in detached basins of this formation, but probably in lower beds, and have also been in all probability improved by metamorphism, due to the elevation of the mountains with which they are in proximity and which has contorted the strata containing them, and in some cases actually set the beds on edge. The deposits here described, however, gain much by their horizontal attitude and easy accessibility and could probably be mined by a system similar to that known as the *long wall* at the expense of a comparatively small amount of mine timber, which in the woodless regions would be a great consideration. The iron stones, though occurring frequently in proximity to the coals, have not yet been observed in workable quantity, but it is highly probable that further exploration may bring such localities to sight. The ones here were stated to be the best of their kind.

The conditions implied by the nature of these deposits are marshes, lakes and estuaries on a strong scale, and from which the sea was for the greater part of the time excluded. The previous deposits of Cretaceous age show that at that time the whole western part of the continent was covered by a sea of some depth in which, during a long time before the advent of the lignite period, fine silty and muddy sediments were laid slowly down; and in them were entombed the remains of *Cephalopoda* and *lamellibranchiata* peculiar to that age. This came on a period of emergence, coarser sediments were carried by the waters, and at last the sea was entirely shut off from the area in question and replaced by great lakes of fresh water with wide swampy margins where the lignites were slowly formed by the

premises.

43-tf

dwelling, situate on BARRINGTON
opposite St. Paul's Church. Apply on the

JOSIAH HOOPER.

FOR SALE.

The premises known as the NOVA SCOTIA BREWERY, situated on Lower Water Street, Halifax, N. S., established in 1820. The Brew House was entirely rebuilt of stone and brick about two years ago, and completely furnished with new plant and machinery, capable of producing 720 barrels malt liquor per week.

There are also on the premises two Malt-houses and Kilns, with Granaries capable of storing upwards of twenty thousand bushels of barley. Capacious frost-proof cellars under the whole of the buildings, for summer stock; also Stables, Cooperage and other out-houses.

The whole of the buildings are of stone and brick, and are in first-class order and most conveniently situated. The business has always been, and is now, highly prosperous and profitable.

The above is a part of the estate of the late Hon. Keith. For further particulars communicate with.

D. G. KEITH,
Nova Scotia Brewery,
Halifax, N. S.

Halifax, February 6th, 1874.

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Bank Notices.

The Flood in Colchester County,

The heavy rain storm and thaw of last Wednesday had the effect of flooding the greater portion of the Stewiacke Valley, swelling the rivers and carrying away all the principal bridges on the main portions of the Stewiacke and Shubenacadie Rivers. This unforeseen disaster has been the means of impeding travel through that portion of Colchester County to a large extent, farmers and others finding it almost impossible to reach the centres of trade and travel, without having to make hazardous detours through the woods in order to avoid the swollen streams and inundated roads, the water on the latter being 12 feet deep in some places. At the Intervale the flood floated the ice away, which, rushing down the rivers with increased impetuosity, smashed the bridges like so many pipe stems. Old residents of the district say the flood was the most extensive and destructive one experienced in that locality for 15 or 20 years.

THE LATE FRESHET.

The Village of Sherbrooke Flooded and Frozen—Extensive Damages.

Mr. A. C. Gillies, of Sherbrooke, writes to the *Chronicle* the following graphic description of the Freshet in that part of the province, and the immense damages sustained by the people of that town:—

“As various and conflicting accounts of the Freshet here will reach you, it is thought to be proper to send you an authentic statement of the facts, so far as they are known at present. On Wednesday, the 4th inst., the weather was delightfully warm; in the evening it rained, and then from midnight till Thursday morning the rain fell in perfect torrents. During Thursday forenoon, though there was no rain, the water in the St. Mary’s rose so fast as to create considerable uneasiness. A couple of miles above Sherbrooke there is a natural dam of rock across the river, beyond which for several miles it is called Stillwater, and where, as there is very little current, the ice in winter is very strong. Our only hope was that the Stillwater ice might be able to resist the pressure from above, for the ice, from about a half a mile below Sherbrooke, was fast nearly to the sea; and, therefore, we knew that, should the Stillwater ice give way, the whole valley on the left bank of the river, on which Sherbrooke is situated, would be completely flooded. More than our worst fears were realized. The Stillwater ice broke up, and the consequences baffle description. The river, which, from “The Forks,” consists of the East and West Rivers, at once overflowed her banks, carrying thousands upon thousands of tons weight of ice, logs and even whole trees uprooted from the banks, down in its almost irresistible sweep. The solid ice below the village refused to move, for the channel there is narrow and protected on each side by steep and rocky banks, and the flats on which Sherbrooke lies very soon became a boiling sea. Boats and canoes were in demand on the main street and throughout the village. The roaring current, the floes of enormous ice, together with logs, trees and every imaginable rubbish, were perfectly frightful. With a few exceptions, every house was flooded—cattle had to be removed out of town, and driven by parties with whips on horseback; women, old people, and children, were taken away in boats; many whole families left their houses altogether, and others moved up stairs. Some barns, offices, and outhouses, were carried away; a couple of bridges in the village, and part of the large bridge on the St. Mary’s are gone. The flood, mountains of ice, logs, trees, and the whole rubbish froze up, so that nearly the entire village is fixed in a frozen sea of indescribable ruins, and must remain so till the gradual thaws of spring will come to our relief! A sudden thaw, in the present state of things, would perhaps ruin the place. I saw Montreal flooded, but it was nothing in some respects to this—for it did not freeze there.

While the flood was rising it was, certainly, except Niagara Falls, the grandest sight I ever saw; but now Sherbrooke, frozen up in a lake of ruins, is the most desolate scene I ever witnessed. The desert is about one mile in breadth, and a mile and a half in length. A vessel of a very superior build, and nearly finished, by Alexander N. McDonald, Esq., for Messrs. Sutherland, England, is broken. Loss about \$5000, besides much timber, etc. Mr. McDonald’s loss will be about \$6000; and Messrs. Cumminger Bros. lose about \$700. Including the new bridge (which, however, is a Government work) the whole damage will not be much less than \$10,000.

On Thursday night very few went to bed. The water is now falling, so that parties are both cutting and paddling their way back into their own houses; but still nearly the whole village is frozen in by the surrounding *debris*. Sherbrooke has had several floods, but this one eclipses them all.

parts of Canada though steeped in poverty a home.

The Magdalen Islands have no harbor suitable for large ships, but that is scarcely drawback, as there is no occasion for large vessels to go there. Amherst Harbor, House Harbor, and Grand Entry Harbor, are suitable for schooners and fishing vessels. The two former are being improved by the Dominion Government, and the latter is accessible to brigs drawing 14 or 15 feet of water. Light-houses have been erected by the Government on Bird Rocks, Amherst Island, Etang du Nord, and Entry Island, to the great benefit of the navigation of the Gulf of St. Lawrence. The Magdalen Islands are accessible to vessels coming through the Straits of Belleisle from the latter part of May until the 1st of January. Of course they can be approached by way of Cape Breton much earlier.

Mr. SMITH expresses the opinion that it is doubtful if the Magdalen Islands will ever be of any importance further than as fishing stations, "the small area of them preventing any large system of agriculture being pursued, and the absence of minerals and coal, together with the scarcity of timber, precluding any commercial industries from being established there." We cannot agree with Mr. SMITH in this opinion, at least we think it premature. The islands may have no minerals except gypsum, but so far no exhaustive search has yet been made. The soil is quite equal to that of Prince Edward Island, the climate is as good, and the area of the island very considerable, being about equal to that of the four Channel Islands, Jersey, Guernsey, Alderney and Sark, which contain 100,000 people. The Channel Islands have an area of 58,000 acres; the Magdalen Islands contain, according to the census, 55,200 acres. The wealth of the fisheries is quite great or greater round the Magdalen Islands and the Channel Islands seem to have no natural advantages over them except, perhaps, a milder winter climate. We would suggest to the Magdalen Islanders that it would be great advantage to them to be attached politically to Prince Edward Island, Quebec being so remote and communication with it being so uncertain. The people of the latter island, and indeed the people of the entire Maritime Provinces would in that case be able to assist those of the smaller ones, and take greater interest in the people and industries of the Magdalen Islands than they now do. Possibly we might even induce Dudley Warner, when he next comes this way, to inquire how to reach the Magdalens.



The Storm and its Effects.

There is reason to fear that the damage done by the rain-storm of Wednesday, throughout the province, has been very great, and when the full list of disasters comes in, it will be found that a very considerable number of bridges have been carried away and large stretches of road greatly damaged by the freshet. We have telegraphed in various directions to ascertain the damage done in the several districts within reach of the telegraph offices, but there are no doubt many districts beyond the reach of the wires which have suffered both in roads and bridges. The rain-storm extended over the whole province but was by far the most violent in the West. Notwithstanding rumors to the contrary, we are assured that the Intercolonial Railway was not affected by the storm, except by the deposit of some mud on the central division, which did not prevent the trains from running almost on time.

The Riviere DuLoup Railway, our Fredericton correspondent telegraphs us, is also uninjured, but on Western Extension the damage is even more serious than we yesterday reported it. The road bed has suffered greatly in several places. At the bluff near Eagle Rock where, as we stated yesterday, the train for Fredericton was stopped, about 300 feet of the road-bed has been washed out, and the eroding along the banks of the Nerepis is carried away, and three feet of mud was left on the track for about 100 yards. The bridge at Gaspereaux, a span of 20 feet, was carried away. Near Knuskillen, about 40 feet of embankment was washed out to a depth of 15 feet, and the road overflowed, so that ice and logs were piled on the track. Near Hoyt a bridge of 20 feet span, over Imagee brook, was destroyed. The track is damaged at the South Branch of the Oroocto, as well as at several other points along the line. The North West bridge, as we stated yesterday, is damaged, but the extent cannot be ascertained until the water subsides and the rubbish is removed. To-day there will be fully 300 men at work on the track, and every exertion is being made to get it so that the trains can run regularly.

THE HARTT'S MILL BRIDGE.

near Fredericton Junction, is, as we stated yesterday, destroyed. It was 300 feet in length and will cost a large sum to rebuild, and greatly inconvenience the people of that part of Sunbury.

THE HAMPTON FERRY BRIDGE.

over the Kennebecasis, is also carried away. This bridge was 700 feet long and was built 13 years ago by Mr. Foshay at a cost of \$20,000. It was on pile piers planked up and its spans were 75 feet wide, which is considered too narrow for so long a bridge. The people of Norton, Kingston and Kars are by this disaster cut off from access to the railway. It will be necessary for the Government to establish a ferry at this point at once.

THE NEREPIIS VALLEY.

A good deal of damage has been done to the roads in Queen's County. Jones' bridge, on the main Nerepis, some distance above Welford station, is all gone. The Perkins bridge, on a branch of the Nerepis, near Armstrong's Corner, was carried over the dam on Wednesday afternoon. Both of these bridges were about 100 feet in length. Several other bridges in the vicinity have been uncovered, and in many places the roads are washed out. There was about seven feet of water on the intervals, and a vast deal of lumber was carried upon them, which it will cost a great deal of money to remove.

THE LOWER NEREPIIS BRIDGE.

The long bridge at the mouth of the Nerepis is also badly damaged, two of the piers having sunk, owing, it is supposed to the sand being washed away from beneath them. This cuts off the parishes of Greenwich and Westfield from the remainder of the county and from St. John. This bridge was a very expensive one, and will be much missed.

FROM FREDERICTON.

The Fredericton news which our correspondent sends us is varied and interesting. The ice is out of the Nashwaak from Gibson's mills to the St. John River, and an immense quantity of debris is jammed against the lower Nashwaak bridge, Crawford's steam tug *Bis-*

mark was carried down from the bridge to the main river. The St. John River had risen some five feet, and the back portion of the city of Fredericton was flooded. The capital is full of storm-saved travellers. Sheriff Harding, Mr. Downside, Mr. Howan and others from Ottawa are there waiting for the damage on Western Extension to be repaired. Hon. Mr. Jones has returned to the Upper House. Mr. and Mrs. Davidson, of St. John, started for home on Wednesday afternoon, but were obliged to return from the Junction. Capt. McLean and Justices Gault, Richard, Thompson, and Baker, who were so successful in their mission in the interest of the Lancaster, Simonds, and St. Martins Highway Act Amendment, are also blocked on the road.

Wheat & Flour etc

THAW AND FRESHET.

The rain storm which commenced on Wednesday of last week produced a great freshet in many parts of the Lower Provinces. Bridges were swept away in all directions and travelling very seriously impeded. In New Brunswick and the eastern portion of Maine the railroad tracks were so badly damaged in many places that travel by rail was partially suspended for two or three days.

All over this Province considerable damage was caused by the storm, and particularly in Colchester County. Several Bridges have been swept away or badly damaged in this County. A bridge at Toney River is gone, Loch Broom Bridge, on West River, so badly damaged by the August storm, has two spans swept away. A Bridge at Springville is badly wrecked. One end of the new Bridge at French River, is down, owing to the abutment being undermined by the flood and canting. When the Commissioners were building this Bridge (which cost somewhere about \$2500) they were warned that the abutment as building was not secure. They disregarded the warning, and now the County must be saddled with the cost of this damage, not to speak of the inconvenience to the public caused by incorrigible bungling. The ice in the East River broke up at 2 o'clock on Thursday morning, and continued breaking up until the River was opened as far down as Stone House point. The New Glasgow Bridge was so badly damaged that it was impassable, except to foot passengers, for several days; and there being no way of crossing at the Mines, the inconvenience to which the public were obliged to submit may be readily understood. The water rose so high that at one time the stern of the "East Riding" was afloat, as was nearly all the timber in the shipyards. A few peices of timber belonging to Messrs. Meikle & Little were floated away from Graham's shipyard, but all, or nearly all, will be recovered. Other damage has been done to Bridges and Mill Dams in various parts of the County, but we are without full particulars.



Terms:--\$1.75 per Annum.
Single copies 4 cents.

Correspondence.

Our New York Letter.

The School Question.

SECTARIAN AND NON-SECTARIAN—A COMPARISON OF THE FRUITS OF THE RESPECTIVE SYSTEMS—A WORD TO SLANDERERS OF THE UNITED STATES.

NEW YORK, 27th February, 1874.
To judge from the Pastoral of the R. C. Bishops, published in the EASTERN CHRONICLE of Feb. 19th, it would seem as if the attack against unsectarian schools, commenced here with such vehemence and utter disregard of public sentiment, has extended to Nova Scotia. In how far the demands in the Pastoral are to be pressed it would be difficult to foresee. They may be resisted for effect in a neighbouring Province, or they may not. Whether in Nova Scotia or out of it, an attack is to be made on the schools, *somewhere*, and the difference is merely one of location, not of fact or principle. Moreover, the Pastoral is intended directly for Nova Scotia itself, and it is therefore no injustice to the eminent clergymen who signed it, by taking it for granted that they mean what they say, and that the school system of Nova Scotia is to be attacked. We wish to disclaim at the outset, any intention to provoke a religious wrangle, be-

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The Pictou Standard
The Late Storm.

THE rain storm on Wednesday night, of last week, caused a great freshet throughout the county. The snow melted rapidly and the ice broke upon the rivers doing much damage to the Bridges and roads. The two spans of the Loch Broom Bridge were carried away, and also the Bridge over Toney River. The bridge at River John was injured, and the French River Bridge and several others carried away. The roads were also badly damaged in many places. The cost of replacing the Bridges will be large, and will absorb all the road money of this county for this year and a considerable more.

Since writing the above we received the following additional particulars regarding the storm, from a correspondent writing from Barney's River:—The Post road between New Glasgow and Antigonish, is very much damaged by the late freshet, the drains sluices and small Bridges being filled with solid ice, and the rain fell so rapidly, the water ran over the road and cut large ruts and holes in it. The water of the rivers overflowed the entervales, and left large cakes of ice and sawlogs and other rubbish on the road at French River, Barneys River, and Marshy Hope. Parts of John Fraser's and Cameron's Mill Dams at Barneys River, were carried away and a great deal of damage was done to other Bridges and Mill Dams in the settlement. It was the largest freshet ever known here. It will take a large amount of money to repair the damages done to the roads and bridges.

for September; Young Ladies' Journal, H
Magazine, Atlantic, DeMorest and Frank Le
October. English and American Newspapers.
sep25 A. P. KATZMA

WHOLESALE DRY **GO**
WAREHOUSE.

FALL, 1873.

ANDERSON, BILLING &

Beg to announce the COMPLETION
of their

FALL STOCK

OF
BRITISH AND FOREIGN
DRY GOODS,

And invite an Inspection of their Customers;
Wholesale Trade generally.

TARR & WONSON'S

DOMINION COPPER PAINT

This Paint has proved itself the best article
kind ever sold in this market.

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THE FRESHET IN THE COUNTRY.—The great rain storm of the 4th and 5th did considerable damage in the country. In many places the rivers overflowed to such an extent as to submerge the surrounding country for miles, doing great damage to bridges, fences, and particularly hay-stacks on the Intervals. Between Mabou and Whycocomah there was great destruction to telegraph lines. In one place several of the posts were thrown down and covered up to the extent of two or three feet with ice, which was brought down the rivers and brooks with the freshet. We learn it was equally as bad in Nova Scotia. Between Antigonish and the Strait, telegraph poles were thrown down and telegraphic communication totally interrupted for about twenty-four hours. McAmus' bridge, near Antigonish, was carried away, in consequence of which our mails were delayed three days.

—*Port Hastings News of the Week.* *Cape Breton*

FRESHET AT MUSQUODBOIT.—The heavy rains and thaws of the last few weeks have caused freshets in the Eastern part of this county, which have been most destructive to property. During the prevalence of the storm fences and trees were blown down, and buildings injured. The Musquodoboit and Gays Rivers overflowed their banks, and the water rose three feet higher than it has for several years past. Travelling through that portion of the county is impossible, and very considerable damage has been done to buildings and other property. — *H. K. Citizen*

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For further particulars see
which can be had at all Booking Stations.
LEWIS CARVELL
General Superintendent
RAILWAY OFFICE,
Moncton, 6th Nov., 1873. } nov20-we

ON.
73.

LINSEED OIL.—90 casks Boiled
seed Oil, Blundell, Spense & Co's brand
Restless and Delta. For sale, wholesale and
by **EDWARD ALBRO & CO.**
Head of Mitchell's wharf
197 Lower Water street
sep27

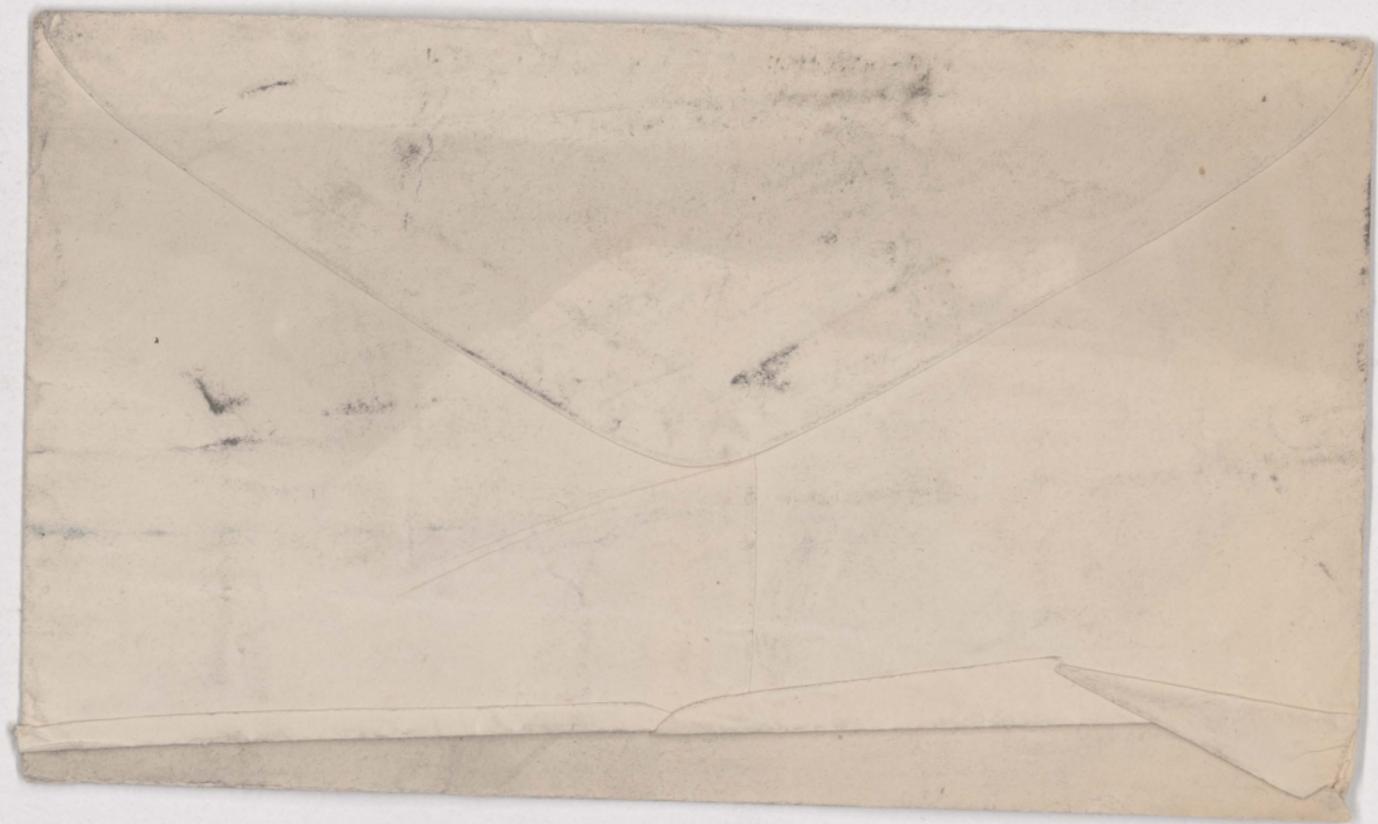
PALE SEAL OIL.—Just received
casks Pale Seal Oil. For sale by
sep30 **JAMES COCHRAN**

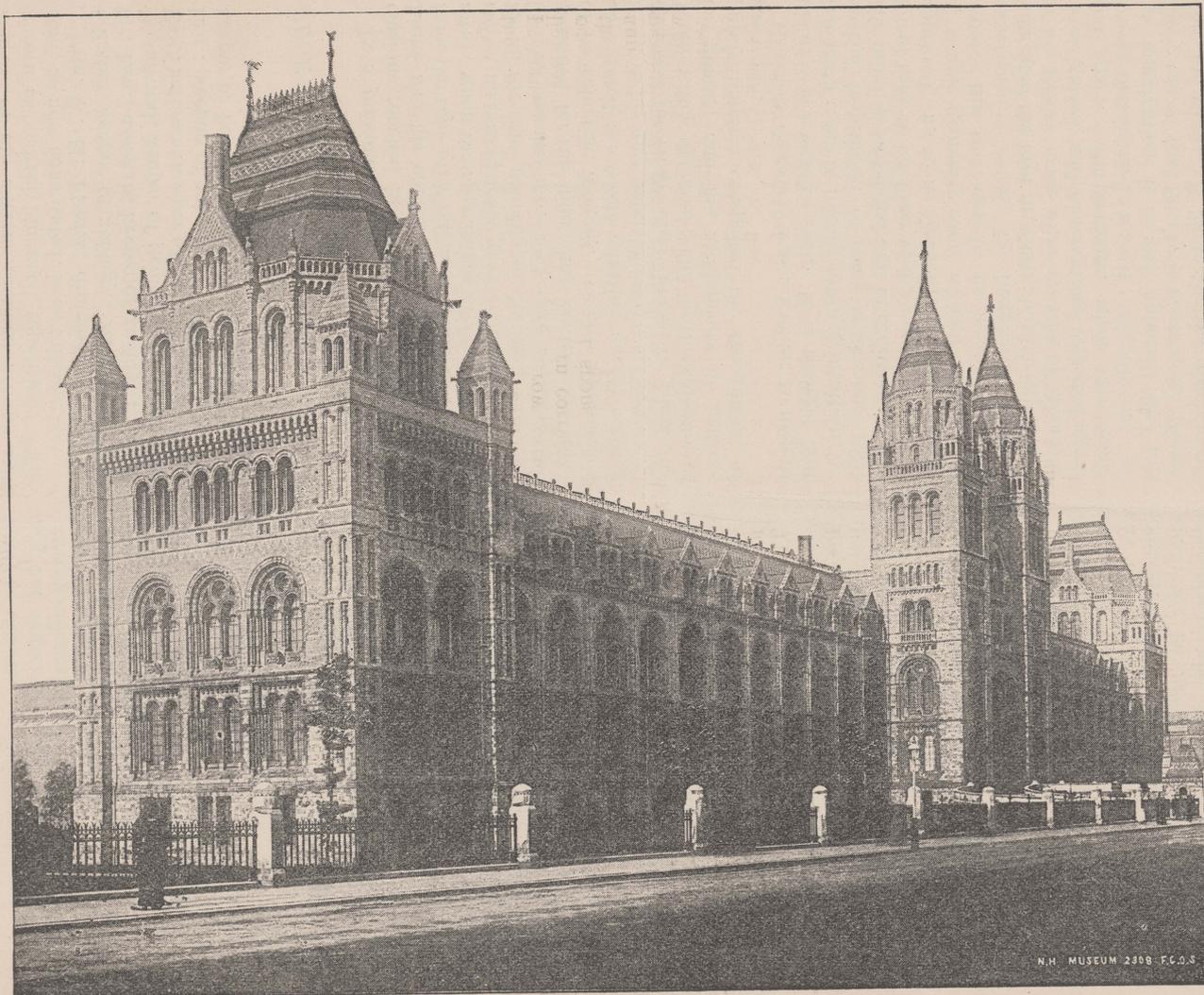
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FLOUR, FLOUR.—Just received
brls choice Extra Flour. For sale by
sep30 **JAMES COCHRAN**

La Verber

1874





MAIN FAÇADE OF THE NEW BRITISH MUSEUM OF NATURAL HISTORY ON CROMWELL ROAD.

hands of the principal librarian of the British museum to the newly appointed superintendent, who is styled director. The names of the keepers of the several sections are so well known as scarcely to need repetition. The staff, as now constituted, is as follows:—

Prof. W. H. Flower, director; Dr. Albert Günther, keeper of zoölogy; Arthur G. Butler, Esq., assistant keeper of zoölogy; Dr. H. Woodward, keeper of geology; R. Etheridge, Esq., assistant keeper of geology; L. Fletcher, Esq., keeper of mineralogy; W. Carruthers, keeper of botany. FREDERICK W. TRUE.

VEGETABLE MORPHOLOGY A CENTURY
AGO. — GOETHE.

In a previous article we have seen the conclusions reached in matters morphological by Linné and his contemporaries. Thirty years from the time of Wolff and Linné had passed away, when the appearance of Goethe's treatise on metamorphosis gave to the world once for all the true solution of Nature's problem, and, as becomes more and more apparent, determined for the nineteenth century the trend of its scientific thought. Goethe approached and stated the whole question anew; worked it out in his own persistent way; set forth with clearness the truths dimly hinted by Linné, by Wolff vainly declared; and by the splendor of his genius, and his attainments in matters purely literary, compelled the recognition of the world.

Goethe's discovery was a wonder to men of his day, is a wonder still. It is thought that the truth came to him by strange intuition, by special inspiration of some mysterious sort. His mind so surpassed that of ordinary men of talent that to his clear vision nought but truth appeared; as to a Newton, the propositions of simple geometry came without necessity of proof. But such was by no means Goethe's experience. Surely his imaginative genius suggested the idea involved; but the exposition of his theory came after months of laborious investigation, and observations repeated again and again. Furthermore, while the result proves that he made a most 'scientific use' of his imagination, it is also apparent that the poetic use of that faculty is never quite absent from his work. If his testing by observation the suggestions of his imagination is scientific, his fondness for generalization, his instinctive conviction of the unity of natural forms, and many of the details of his theory, are poetic in the extreme.

Goethe wrote of metamorphosis. The term 'morphology' does not appear in his writings until 1807. He uses the former word, however, to denote, not the actual conversion of any one organ into any other, but simply the correspondence of all organs discussed to one and the same ideal type.

In setting forth his theory, Goethe begins with the cotyledons, and shows them to be leaves after their fashion, differing in form from the ordinary leaf of the plant as they differ in function. He also notices that the first true leaves put forth are likewise not perfect, but are usually much narrower and simpler every way than those that follow. Goethe believes that the varying form of the leaf is due to variable nourishment. He regards the sap which nourishes these early leaves as very crude and poor indeed. He observes that the successive nodes of the stem receive each its sap through the medium of those below, and so each receives and furnishes to leaf and bud purer and more refined juices. Further, while the more imperfect fluids are constantly discarded, the purer are as continually assimilated and used, until Nature reaches her prescribed limits of growth: the leaves attain their greatest extent and perfection in development, and all is prepared for a new phenomenon.

Linné had shown that abundant bloom comes from scant nourishment. Goethe reasserts this, and argues, that, so long as raw material is to be disposed of, so long must all possible organs of the plant be converted into tools for the purpose. If too much nourishment is provided, the condition of blooming becomes impossible. Withdraw the nutrition, the organs of the node become more refined; the elaboration of juices unadulterated, purer and more refined takes place; the metamorphosis of the parts becomes possible, and forthwith ensues. When, in the light of present knowledge, we reflect upon the cost at which any plant puts forth its bloom, these century-old surmises of the poet seem to acquire new meaning and most peculiar interest.

In Goethe's time the involucre of a composite flower was still regarded as calyx, and accordingly the gradation from bracts to sepals was easy enough. This mistake does not, however, vitiate the poet's argument on this point; for he asserts the same transition in other plants, and cites the *Compositae* simply as affording the most patent illustration. He argues with perfect clearness, that the assembling about one point of several leaves, nay, even of several nodes, is not strange, as the same thing may be met in every plumule. The

no 6

RED PHEASANT.

This Indian Chief, of whom we to-day give a remarkably good picture, is the head of a band of Crees, about one hundred and forty in number, of whom sixty-nine are men and women able to work, who have for some time been settled upon a reservation a short distance to the south-east of Battleford. While that post was the Indian headquarters for the North-West, this band received a great deal of attention, but, while they were encouraged to break up land, given implements and tools and were provided with houses, they appear to have become actually pauperized. They are spoken of in the last reports as being "apathetic," and as having made but little progress. In all they had twenty horses and about fourteen oxen. The first offensive act of this band was the breaking in upon their instructor, Mr. George Applegarth, and their pursuit of him and his wife as they escaped over the plains toward the south. Poor Payne, the instructor, upon the adjoining reserve, was not so fortunate, having been killed. The two bands, which in all would amount to about 450 souls, then appear to have abandoned their reserve and gone north-west to join Poundmaker, the leader of the Indian rising west of Battleford, as when Col. Ottar's column reached the reserve it was entirely deserted, and, as our correspondent stated in his despatch, the dead body of the murdered man was discovered and has since been buried at Battleford. Shots have also been exchanged between the advance guard of the expedition and Indians, who were likely of this band, in this vicinity.

Dear Mother

FIG. 3.



FIG. 3. RUDE STONE AXE IN A WOODEN HANDLE. $\frac{1}{3}$ FROM TASMANIA.

FIG. 4. STONE CHIPS FASTENED BY GUM TO A WOODEN HANDLE. $\frac{1}{3}$
FROM AUSTRALIA.

given proof of their organizing power. They brought together a national congress composed of delegates from every political society of any importance throughout the country. Seventy-one members met together; twenty-nine great districts sent spokesmen. The whole of India was represented, from Madras to Lahore, from Bombay to Calcutta.

For the first time, perhaps, since the world began, India as a nation met together. Its congeries of races, its diversity of castes, all seemed to find common ground in their political aspirations. Only one great race was conspicuous by its absence; the Mohammedans of India were not there. They remained steadfast in their habitual separation. They certainly do not yield to either Hindoo or Parsee in their capacity for development, but they persistently refuse to act in common with the rest of the Indian subjects. Not only in their religion, but in their schools, and almost all their colleges, and all their daily life, they maintain an almost haughty reserve. The reason is not hard to find. They cannot forget that less than two centuries ago they were the dominant race, while their present rivals in progress only counted as so many millions of tax-paying units who contributed each his mite to swell the glory of Islam.

But in spite of the absence of the followers of the prophet, this was a great representative meeting. The delegates were mostly lawyers, schoolmasters, and newspaper editors, but there were some notable exceptions. Even supposing these three professions alone provided the delegates, the meeting would fairly represent the education and intellectual power of India. Not a word was said of social reform; all they discussed, and all they demanded, was political power and political changes; a tone of most absolute loyalty pervaded all the proceedings. Education and material prosperity, order, security, and good government, were all incidentally mentioned as causes of gratitude towards the present rulers. But such allusions were only by the way. Every desire was concentrated on political advancement and an immense increase of the share at present given to the natives of India in the government of their own country. The question of their ability to govern themselves was never even touched upon by the wisest of the speakers. Though there was much crude talk, much of that haste which only makes delay, and that ignorance which demands premature concessions, and too implicit reliance upon legislative powers, there was also much of most noble aspiration, and a sense of patriotism and national unity, which is a new departure in the races of the east.

PREJEVALSKY'S EXPLORATIONS IN MONGOLIA.

THE renowned traveller and explorer, Colonel Prejevalsky, to whom a reference is made in our St. Petersburg letter, arrived there on his return journey from Mongolia, the earlier part of the present month. A correspondent of the London *Times* says that this expedition of Colonel Prejevalsky, lasting two years, and costing over 43,000 roubles of government money, has been the most remarkable one ever undertaken in the wilds of Mongolia and Tibet. The intrepid explorer, as his published letters have already shown, literally fought his way into these inhospitable regions, at the head of a well-armed party of thirteen Cossacks, four grenadiers, and a host of other attendants; and, as he stated at Moscow, more than one hundred natives, who at different times waylaid the explorers, were made to feel the deadly effects of the Berdan rifle-fire. The exact numbers of the killed and wounded were stated in the extremely interesting letters addressed to the Grand Duke, at various stages of the journey. This is scientific exploration with a vengeance, and goes beyond any thing that Mr. Stanley did with his 'six-shooter' among the negroes of Africa.

In the last of the above-mentioned series of letters, the colonel also expressed the ardent wish of the Mongolian natives to be taken under Russian protection, and shielded from Chinese oppression. The same idea he has again impressed upon his friends, in answer to their many inquiries, as they greeted the tall, sun-burnt traveller. The *Viedomosti*, referring to this, says, "Among the natives visited by Colonel Prejevalsky there exists a deep conviction that sooner or later the 'great white czar' will enter their country and take them under his domination. At one place the explorer showed a portrait of the emperor to one of the natives, who went into raptures over it, and soon large crowds of inhabitants, with women and children from the neighboring districts, gathered round the colonel and implored him to show them the likeness of the 'white czar.'"

The regions visited by Colonel Prejevalsky are generally supposed to be, nominally at least, within the dominions of the emperor of China. No wonder, therefore, that rumors of a protest have come from Peking. The grenadiers who accompanied the expedition have been promoted, and, besides receiving pecuniary gratifications, have had their portraits distributed throughout the regiment. Colonel Prejevalsky has given a number of Russian names to newly-discovered places, such as the 'Moscow-Chain,' the 'Kremlin

Rock,' and the 'Czar-liberator's Mountain.' One hundred and fifty photographs and sketches were taken, and a large number of geological and other specimens were collected. The expedition will no doubt have important scientific, and perhaps other results.

THE U. S. GEOLOGICAL SURVEY.¹

THE plan of this volume is the same as that of its predecessors, comprising, first, the summary report of the director; second, brief administrative reports of the chiefs of divisions on the work accomplished in the several departments of the survey, with brief itineraries of the field-parties; and, third, the accompanying papers, which make up the main part of the volume, and are the only feature of permanent interest or value. These papers are the monographs or final reports finished during the year. The longer monographs appear here in abstract form only, being, like the more fragmentary bulletins, published separately for the use of specialists. But, although the annual volume is not a perfect *résumé* of the survey, it is wisely designed to present all the results of interest to the general reader.

The principal feature of Major Powell's summary report for 1882-83 is the preliminary statement of the proposed topographical and geological map of the United States, with the accompanying map showing the, for the most part, very limited areas which have been surveyed under the authority of the various states and of the general government, on a scale suitable for the present purpose. The scale adopted for the proposed map is 1:250,000, or about four miles to the inch, with contour lines for every twenty-five to two hundred feet, according to the character of the topography. It is proposed to publish this general map in atlas sheets, each being composed of one degree of longitude by one of latitude, in areas bounded by parallels and meridians.

Although the administrative reports indicate a larger amount of topographic and geologic work than for any previous year, the published results are comparatively meagre, the monographic portion of this volume falling decidedly below the average in extent, if not in general interest. The most important paper has only an indirect relation to the geology of the United States. This is Captain Dutton's able memoir on the volcanoes of the Hawaiian Islands. This work was not done at the expense of the survey, nor in anticipation of the annexation of the island kingdom to this

country, but simply as a preparation for the study of the gigantic lava-flows of the Cascade Range in northern California and Oregon, — a work upon which Captain Dutton has since been engaged. Hence criticism of the survey for extending its operations beyond its legitimate field is forestalled, and the publication of this valuable contribution to our knowledge of the noblest of living volcanoes will undoubtedly be justified by the light which it will throw upon the volcanic phenomena of our north-western territories; for, while these are unparalleled among the eruptions of historic times, the evident liquidity and the vast volume of the lava plainly suggest the stupendous flows of Hawaii as the proper preparatory field of the student who would bring to their investigation the best comparisons that modern volcanism affords.

It is impossible here to do justice to the graphic descriptive chapters, which fully sustain the reputation achieved by the author for the bold and discriminating portrayal of geologic phenomena, in his reports on the plateau country and the Grand Cañon. But the highly important and original chapter on the volcanic problem may not be disposed of so summarily. Captain Dutton has here gathered together the principal facts and conclusions reached in his study of Mauna Loa and Kilauea, with a view to ascertaining whether they shed any new light upon the dark problem of the volcano. He goes to the root of the matter at once by calling attention to the fact that the volcano is essentially a heat problem, and that the final solution to be sought is an explanation of the origin of this heat and its modes of action.

The universal postulate that the earth's interior is throughout in a state of incandescence is accepted as a matter of course; but the question as to whether it is mainly liquid or solid is regarded as still in abeyance, and the determination of this point is not considered essential to the discussion of the volcanic problem. Against the view that the penetration of water to the seat of the internal fires is the cause of volcanic action, two objections are urged. 1°. The access of cold water would cool, and probably solidify, the lava. It might be claimed on the other side, however, that the water must be itself very hot before it reaches the lava, and that aqueo-igneous liquefaction takes place at much lower temperatures than dry fusion. The vaporization of the water would, however, absorb a large amount of heat. 2°. But this last consideration is rendered unimportant by the second objection; viz., that liquid water cannot pass the isogeotherm of 772° F. (the temperature of its critical point), and hence must be vaporized long before it reaches the lava.

That aqueous vapor may penetrate to the reser-

¹ *Fourth annual report of the U. S. geological survey to the secretary of the interior (1882-83)*. By J. W. POWELL. Washington, Government, 1884. 8°.

voirs of liquid rock and be absorbed by it, as any gas would be by a liquid, is regarded as entirely possible, and not improbable. But great emphasis is properly laid upon the fact that this gradual absorption of hot vapor by hot lava would not create any tendency in the lava to explode or erupt, unless accompanied by a diminution of pressure or increase of temperature; and it is demonstrated at considerable length that no changes of temperature or pressure in the magma, of sufficient magnitude to merit consideration, are possible: consequently the balance of probability is regarded as inclining decidedly against the hypothesis that water is the cause of volcanic action. It does not appear, however, that Captain Dutton has taken any account of the important consideration, that, by the rising of the isotherms, water-impregnated portions of the earth's crust may conceivably attain a high degree of liquidity and expansive force; i. e., be made eruptible.

The hypothesis that volcanic energy is due to the penetration of oxygen to the unoxidized earth-matter below the crust is also rejected, mainly because it appears to be insusceptible of proof or disproof, postulating conditions beyond the reach of argument, but partly on account of the difficulty of finding a sufficient amount of oxygen. The statement, however, that some naturalists *imagine* that the earth's interior is imperfectly oxidized is certainly unwarranted, in view of the fact that basic lavas contain metallic iron and a vast amount of iron in a low state of oxidation.

Mallet's theory, that volcanic heat results from the mechanical crushing of the rocks when the crust yields to the powerful horizontal pressure due to the cooling of the interior, and mountain-ranges, rock-folds, and faults are produced, shares the same fate; chiefly because it is now probable that the cooling of the earth has been up to this time comparatively superficial, the infra-crustal regions being still as hot as ever. But Captain Dutton's argument is not conclusive, since he has simply shown that the corrugation of the crust must be ascribed to some other cause, such as the diminution of the earth's oblateness in consequence of the retardation of its rotation by tidal friction. The corrugation itself is an unquestioned fact, and, however produced, must have been attended by an enormous development of heat.

The fourth hypothesis examined assumes a local development of heat in the earth by unknown causes. This cuts the Gordian knot instead of untying it, but is rejected because its conditions preclude all discussions of its validity or adequacy. Relief of pressure would greatly promote the liquefaction and elastic expansion of lavas; but

this is unconditionally rejected as a cause of eruptions, since denudation, the only cause of diminished pressure which Captain Dutton recognizes, cannot be correlated in its distribution with active volcanoes.

Having thus discredited all hypotheses of the origin of volcanic heat heretofore proposed, Captain Dutton advances no new view, but coolly demolishes our hope with the statement that Mauna Loa and Kilauea do not throw any more light upon the general problem than other volcanoes. He proceeds to show, however, that in other directions they have contributed something to our knowledge of volcanism. They are at once the largest and most active of volcanoes, activity being measured by the outflow of lava, and dissipation of energy. They agree with active volcanoes in general in standing on an area of elevation. That Hawaii has risen nearly three thousand feet in comparatively recent times, is regarded as clearly proved by the elevated beaches and terraces. The problem of the causes of elevatory movements is then attacked, and the numerous hypotheses are reduced to two alternative propositions; viz., the elevated portion of the earth has experienced an increase of matter, or it has undergone expansion. While local increments of mass are not ignored, the expansion hypothesis is accepted as the one agreeing best with the observed facts; and the tangential thrusts of the earth's crust are definitively rejected as a primary cause of vertical movements. Our author wisely refrains, however, from estimating what proportion of the altitude of the Alps and other mountain-ranges is due to the crumpling of their strata; this crumpling being unquestionably due to horizontal thrusts, and amounting in the Alps, according to Heim, to seventy-four horizontal miles. Hawaii, we are told, floats high because of the lightness of this part of the earth's crust, its relatively low density being due in part to its high temperature, and in part to the porosity of the lava, and the numerous and often large tunnels by which the entire island appears to be honeycombed. But no calculation is given of the increase of temperature required in a thin crust, with a reasonable coefficient of expansion, to produce an elevation of two or three miles in a non-volcanic region. It is not easy to see how the expansion hypothesis can survive application to really important instances of elevation.

Captain Dutton regards the Hawaiian volcanoes as immense columns of liquid lava with their accumulated overflows; and the upper ends of these columns, whether frozen over or exposing fiery lakes to the sky, are believed to be fundamentally unlike the craters of ordinary volcanoes. The

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term 'caldera' is proposed and used as a general name for volcanic orifices of the Hawaiian type. As the column of lava gradually melts away the enclosing rocks, the caldera is enlarged by the falling-in of the surface, and it is not in any case due to explosions. Mauna Loa and Kilauea are clearly independent volcanoes; and we have no reliable indications that their activity is diminishing. The vast antiquity of the Hawaiian volcanoes is plainly shown, not only by their magnitude, but also by the wonderful progress of the agents of erosion, especially in those islands where the volcanic fires are now extinct. This is one of the principal topics discussed in the chapters on Maui and Oahu.

The abstract of the report by Mr. J. S. Curtis on the mining geology of the Eureka district, Nevada, supplements that by Mr. Arnold Hague on the general geology of the same district in the preceding volume. It is accompanied by sections of the principal workings, and discusses exhaustively the characteristics and probable origin of these singular ore-deposits, which had yielded sixty millions of dollars up to the close of 1882.

Following this is a short but useful chapter on popular fallacies regarding precious metal ore-deposits by Mr. Albert Williams, jun. Dr. C. A. White's review of the Ostreidae of North America, with an appendix by Mr. Heilprin, and thirty-eight plates, describes in simple yet scientific language all the known fossil species and the single living species of the Atlantic coast. A second appendix by Mr. Ryder, with eleven plates, is devoted to an interesting sketch of the life-history of the oyster.

The volume concludes with Mr. I. C. Russell's geological reconnaissance in southern Oregon, with two maps and sixteen small sections. This is a short but highly interesting account of the extreme northern part of the Great Basin, which is shown to possess the same structural and climatic features as the basin of Lake Lahontan, which bounds it on the south, and was described by the author in the annual report for 1881-82.

GEOGRAPHICAL NOTES.

Missionary maps.—The establishments of Les missions catholiques at Lyon, France, have issued an atlas containing data collected by the Catholic missionaries in various parts of the world. Beside the general maps, which resemble those of any good elementary atlas, there are some thirty detailed maps which have appeared from time to time in the organ of the missionary bodies. Numerous important additions to geography have been made by the missionaries; and, in bringing

them together in convenient form, the atlas meets a real need. They appeared first in German, with explanatory text by Father O. Werner, and have been translated into French, with additions, by Valerien Groffier.

A newly discovered affluent of the Kongo.—The despatches from the Cape of Good Hope state that the expedition under Lieutenant Wissmann has discovered a new affluent of the Kongo, which will have an important bearing on the opening-up of the lower Kongo basin. Wissmann is on his way to Europe with the details. The new river is a powerful stream, over five hundred miles in length, between the equator and Stanley Pool. It is eight miles wide at its mouth, and quite deep. There were no obstacles to its navigation and the Pogge Falls, in the Tapende country, latitude 6° south, and longitude 22° east. Lake Lincoln, to be found on some charts, does not exist: the only lake encountered was Lake Leopold II., near the Kongo. The journey was made in large canoes constructed by the expedition, and a way was forced through the territory of savage cannibal tribes, who, if armed with guns instead of arrows, would have prevented their passage. In a single day as many as five conflicts took place, and several of the party were wounded, though none were killed. The journey was accomplished by Lieutenants Wissmann and Müller, a physician, artificer, and forty-six natives. The ferocity of the natives is accounted for by the fact that they had never seen white men or fire-arms. More details will soon be accessible. Meanwhile it seems more likely that the river is one of those which have been known only by report, rather than an entirely new discovery. The country is reported to be fertile, producing palm-oil, sugarcane, rice, and other tropical products.

Explorations in Central South America.—De Brettes sends a short note on his recent travels in the unexplored part of the southern district of the Gran Chaco, which began last March, and lasted forty-four days. He discovered a large salt lake (along which his party travelled nine days, and the west shore of which is estimated to be one hundred and thirteen miles long), also three rivers, running in a northerly direction, supposed to be tributaries of the Rio Vermejo. The south Chaco is flat, covered with thorns, mimosas, and tall herbage. The natives are hypocritical and cruel, and live in utter barbarism. After penetrating two hundred and twenty miles into the unknown region, the explorers were obliged by fever to retrace their steps to Corrientes. A new expedition was in contemplation.

Restoration of Lake Moeris.—The investigations of Mr. Cope Whitehouse in regard to the

Mr. Curtis's
 Review
 of
 the
 Geology
 of
 the
 Eureka
 District
 Nevada

to be accounted for,— facts, possibly, best explained on the supposition of a greater subsidence of the western as compared with the eastern regions leading to submergence of the plains under water sufficiently deep to carry icebergs of large size.

GEORGE M. DAWSON.

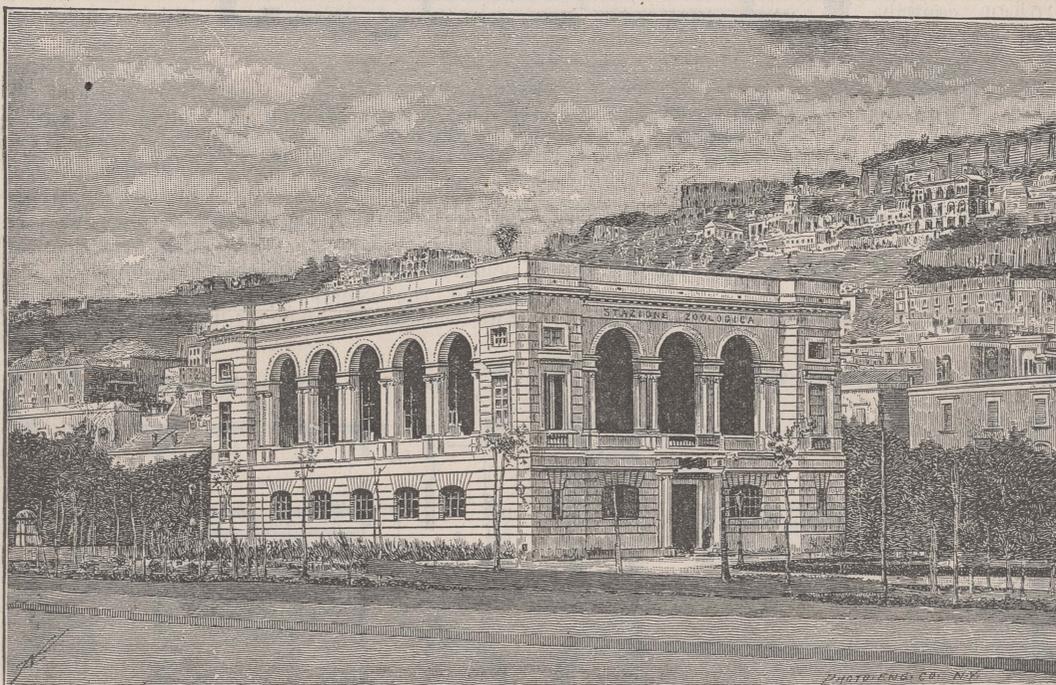
Geol. survey of Canada, Ottawa,
April 10, 1883.

THE NAPLES ZOÖLOGICAL STATION.

I.

FOR half a century past, Naples has been the favorite resort of the zoölogists of Europe

Dr. Anton Dohrn, in his voyages to the Mediterranean to carry out his researches, experienced, as others had done, grave difficulties which he could not, single-handed, overcome. To realize the conditions necessary for extensive and thorough work requires not only a large expenditure of money and time, but a permanent and growing institution, which provides all the instruments of research in a locality where nature furnishes in abundance and variety the material to be studied. To carry on biological work on a large scale in as many directions as possible, with a thoroughly equipped laboratory, permitting investigators to apply to their researches the most



on account of the wealth of the fauna of the neighboring waters. But the independent efforts of solitary naturalists were naturally unable to secure all the advantages for science which could be gained by suitable organization. Two old fishermen, who, forty years ago, were turned aside from fishing for the market, and trained to collect for science by Johannes Müller, are still at work in the gulf, not now alone, but with a dozen other men, collecting with dredges, nets, hooks, and scaphandra, material for nearly thirty investigators, studying with all the resources of a completely organized laboratory in the zoölogical station.

elaborate technical processes, and to make use of the best modern methods, with all the material that these rich southern regions can supply, all the help that may be had from a well-furnished library, all the aid that can be obtained from well-trained attendants and subordinates, and all the stimulus and assistance that consciously and unconsciously comes from the intercourse of many minds giving their best powers to the same work,— this is the aim of the zoölogical station. To this object Dr. Dohrn has devoted the last fifteen years of his life, making even his own important researches a secondary consideration;

and, having founded the station, he has gathered about him a group of earnest investigators, animated by the same spirit, who form its permanent scientific staff.

The station was opened in 1874; and the total cost of its building was \$85,000, exclusive of the cost of the site, which was given by the Neapolitan municipality. Dr. Dohrn contributed \$60,000 of his own property, and obtained a grant of \$20,000 from the German government. The other \$5,000 was

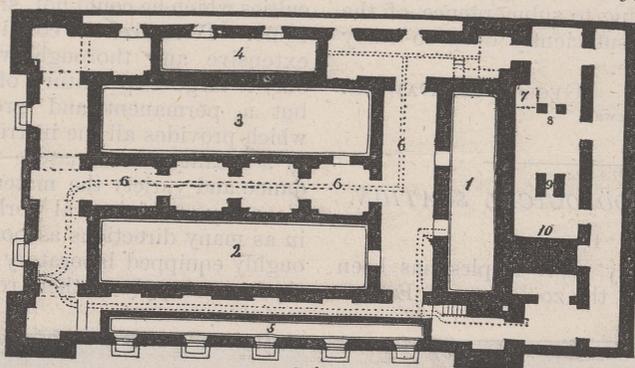
presented by some of the eminent friends of science in England, — Professor Huxley, Sir Charles Lyell, Mr. Darwin, Mr. Balfour, and others.

The situation of the building is exceedingly

of Ponlippo, eastward to the mountains of St. Angelo, while to the north-east the town rises in terraces from the bay, in the form of an amphitheatre, with the smoke of Vesuvius in the background, rising into the sky, and floating away towards the horizon.

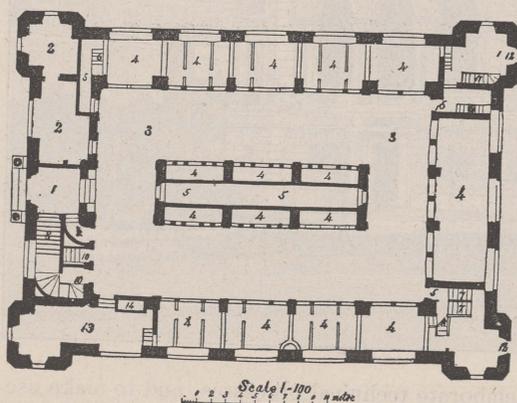
The lower floor of the station is occupied by the well-known public aquarium, which consists of thirty tanks, the largest holding two thousand cubic feet of water. The beautiful creatures of the Mediterranean

are to be seen in these tanks, living in their natural conditions, — the delicate transparent pelagic animals, the medusae, ctenophores, and salpae, the expanded corals and polyps and tube-worms, with their brilliancy and variety of



PLAN OF BASEMENT.

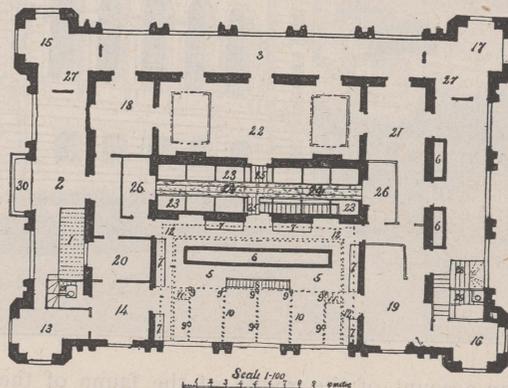
1. West reservoir ; 2. South reservoir ; 3. North reservoir ; 4.
5. Storage basins ; 6. Pipes connecting the reservoirs and basins with the pumps ; 7. Pump-reservoir ; 8. Pumps ; 9. Engine ; 10. Boiler.



PLAN OF GROUND FLOOR, OR AQUARIUM.

1. Entrance ; 2. Office ; 3. Open space for visitors ;
4. Aquarium ; 5, 6. Passages and staircases for the service of the basins ; 7. Staircase to laboratory ; 8. Main staircase to same ; 9. To retiring-rooms ; 10. To engine-room ; 11. To engine-room ; 12. Entrances for fishermen and attendants ; 13. Small laboratory ; 14. Working aquarium of the same.

fortunate; it stands in the middle of the gardens of the 'Villa nazionale,' a few rods from the shore; and from its loggia one looks southward, over the wide expanse of the gulf, to Capri in the distance, westward to the ridge



PLAN OF UPPER FLOOR, OR LABORATORY.

1. Main staircase ; 2. East loggia ; 3. South loggia (both open) ; 4. West loggia, closed by windows ; 5. Large laboratory ; 6. Working aquarium ; 7. Large cabinets ; 8. Iron staircase leading to 10, platform at mid height supported by iron pillars (9) ; 11. Staircase leading to 12, gallery destined for the collections, but at present used as the library ; 13-18. Unfinished rooms attached to the laboratory ; 19, 20, 21. First, second, and third assistants' rooms ; 22. Great hall intended for the library ; 23. Lighted court ; 24, 25. Longitudinal and transverse passages through the same ; 26. Vestibules ; 27. Restaurants ; 28. Staircase to aquarium ; 29. Staircase to attic ; 30. Chimney ; 31. Balcony.

up by Mr. J. S. Gardner, F.G.S., F.L.S.—The report opens with a list of all the principal works on the British Tertiary flora down to the year 1883. The number of species that had been more or less described were:—From the Thanet beds, 3; from the Reading beds, 9; from Sheppey, 108; from Alum Bay, &c., 43; from Bournemouth (deducting those not peculiar), 11; Bovey Tracy, 50; Upper Eocenes, 13; Mull, 9; Antrim, about 16; making a grand total of 262 species, not a tenth part of which, Mr. Gardner anticipates, would survive a rigorous examination. The study of only one group of plants—the Gymnosperms—has been the serious business of the past three years; for not only have I had to study, but in the majority of cases to find the specimens as well. I trust that the results attending the expenditure of the grant I have been favoured with may be considered satisfactory, and these I now proceed to detail.

Bracklesham Flora.—Two visits have been made to Selsey. The beds, it is well known, are marine, but a few terrestrial fruits are from time to time procured from them. I was able to make a large collection of fossil shells while looking for plants, which, being from the highest beds, are less known, and are interesting as illustrating the passage from the Bracklesham to the Barton fauna, which is more gradual, I think, than is supposed. The surface of one of these beds is dotted over with fossil *Posidonias*, a marine monocotyledonous plant identical with the species now inhabiting the Mediterranean. It had not been previously recorded as a British fossil, though another species is abundant in the contemporary beds of the *Calcaire grossier* of the Paris basin. In our species the rhizomes radiate from a centre, whilst in the French and other European fossil species they are long and branching. They are found among beautiful *Tellina* shells, preserving, to a large extent, their banded colours. The only other fossil plant to record here is a *Nipadites*, which, unlike those of the Bournemouth beds, is large, flattened, and oval.

Reading Beds.—A considerable portion of the grant has been expended in working these beds with, I am pleased to report, the happiest results. The flora is found in the Katesgrove pit, on the banks of the Kennet, immediately beneath the mottled clay. The matrix is a fine porcelaneous fuller's earth interstratified with sand, and the beds seem very local. The limit of the pit being reached, it is not probable that any part of the beds will be exposed for long. I have illustrated a beautiful specimen—one of several—of *Auenia subretacea*, Sap., from these beds. This fern is highly characteristic of the lower Eocenes in France, but had only previously been found in the middle Bagshot beds of Bournemouth in this country. I have also illustrated another fern (?) from these beds, of which I have only as yet found a small fragment. The figures are therefore taken from specimens found many years ago by Prof. Prestwich. Other valuable additions to the Reading flora are some splendid specimens of a conifer, which I can see no ground for distinguishing from *Taxodium heterophyllum* of China. Another interesting specimen from Reading is a pine leaf of two needles, about the size and substance of those of *P. maritima*, the first pine foliage, I believe, ever found in the English Eocene. One leaf bed is almost wholly made up of leaves of *Platanis*, and a bed above is fairly sprinkled with fruits of the same. Fruits are very abundant, and include four kinds of leguminous pods, and there are many flowers. As a result of this work the Reading flora no longer appears so completely distinct from that of Bournemouth.

Woolwich Beds.—I regard these as thoroughly distinct in age from those of Reading. I have not found, in the course of two visits paid for the purpose, any bed worth collecting from, though I think such must exist at Lewisham.

Studland Beds.—We were able to reach a leaf bed in the Lower Bagshot at Studland, and to obtain a great number of specimens, nearly all of which are quite new to me. They are mostly dycotyledonous leaves and fruits, which will require time to determine. There are no Coniferæ among them, and I am only able to add one fern—a *Lygodium*, very near to that of Bournemouth—to the *Chrysodium langæanum*, procured abundantly by me ten years ago in a different bed at the same locality.

Hordwell Beds.—I have to add *Salvinia* to the flora, not previously found fossil in England, and exclusively confined to the Miocene in Austria and Switzerland.

Barton Beds.—A new species of pine from Highcliff was discovered quite unlike those hitherto found at Bracklesham.

The beds are rapidly assuming an angle of repose, and becoming deeply buried under *débris*, so that some of them are no longer visible except by making excavations. Though the Barton series is one of the most interesting of our Eocene formations, the detailed bedding has not been worked out like that of the Bracklesham series below and the Headon series above, and the greatest misconceptions seem to prevail as to the number of species of fossils that it contains.

Bournemouth Beds.—Five series of leaves were obtained this year by Mr. Keeping and myself, the most noteworthy of which are some specimens of *Godoya* which exceed any I had previously seen. I have illustrated a new and very distinct species of *Adiantum*, a fragment of what may be *Gymnogramma*, and a trifold group of *Polypodium* leaves, which seem to be different from either of the species previously recorded.

The London Clay.—Mr. Shrubsole has kindly sent me some of the best of the fruits that have been found. I have not made any complete studies of them yet, but they promise to afford results of the highest value. Among a few recognised is the very unmistakable seed of *Verschaffeltia*, a genus of palms from Seychelles quite new to fossil floras.

Gurnet Bay Beds.—I have been able to ascertain that another fern rivals *Auenia subretacea* in range, *Chrysodium langæanum*, which extends from the town of Bagshot upwards into the Bembridge beds. The plants are as a rule dreadfully macerated and chopped up. Among them are small fragments of a *Gleichenia*, which, though not very beautiful, is a very important fern, coming from the horizon. By far the most important discovery, however, is that of *Doliostrobus*, the first really extinct conifer that I have met with in British Eocenes. It belonged to the tribe of *Araucariæ*, and its identification has been thoroughly confirmed by correspondence and the interchange of specimens with Dr. Marion, the well-known botanist of Marseilles. It is certain that during the Eocene period, as the temperature increased from the base upward to the Middle Bagshot, when the maximum of heat seems to have prevailed, there was a tendency for the plant world to move northward. It is equally certain that in the later half of the Eocene, as the temperature began to decrease, the movement was in the opposite direction, and we find in the European Miocenes of Switzerland and Italy a number of plants that at an earlier period were growing in the far north.

Report of the Committee, consisting of H. Bauerman, F. W. Rudler, and Dr. H. Johnston Lavis, for the Investigation of the Volcanic Phenomena of Vesuvius, by H. Johnston Lavis, M.D., F.G.S., Reporter.—The unfortunate outbreak of cholera in Naples and the stringent local quarantine measures prevented work on Vesuvius being carried out during the autumn of 1884. Nevertheless, daily observations were made of the variations in the activity of the volcano, of which a careful record has been kept. All important changes of the crater-plain, and in the cone of eruption, have been photographed. Descriptions of the small eruption of May 2 of 1883 have already been given in NATURE, and the results of a microscopical examination of the sides of the remarkable hollow dyke then formed will soon be published. The Naples section of the Italian Alpine Club have generously undertaken to publish a journal of Vesuvius, which will contain reproductions of the photographs exhibited. The third sheet of the geological map of Vesuvius and Monte Somma (scale 1 : 10,000) has been completed by the reporter, and is exhibited at the meeting. The relationship of the varying activity of a volcano in a Strombolian state of activity to barometric pressure, the lunar tides, and rainfall, cannot but be regarded as important in solving some questions of vulcanology. Instrumental means of measuring such present so many practical difficulties that a scale of activity has been drawn up, which requires only a few minutes to learn, can be practised by any one with good eyesight and moderate intelligence who is within visual range of the volcano, and, above all, requires no further outlay than pen, ink, and paper. The objections will be mentioned after describing the process. 1st degree, a faint red glimmer above the main vent interrupted by complete darkness; 2nd degree, the glimmer is continuous, but the ejection reaches hardly above the central crater rim at the most; 3rd degree, glimmer continuous and well marked; the ejections are distinctly discernible as they rise and then fall on the slopes of the cone of eruption and roll down its slopes; 4th degree, the ejections reach a considerable height, are brilliant, and light up the top of the great cone; 5th degree, verging on an actual paroxysmal

eruption, the ejections are shot up very high, being only very slightly or not at all influenced in their course by a strong wind. Each explosion follows with much rapidity, and corresponds with the "boati" heard all around the west, south, and south-east slopes of the mountain. The objections to this method of registering the variations in the activity of a volcano are: (a) cloud-cap, which may for days cut off the view; (b) after a great eruption, resulting in a deep crater, the changes of activity would be invisible from the neighbourhood of the mountain; (c) it is only applicable after dark, so that usually only one observation a day can be made; (d) should lava be flowing from a lateral outlet, as is often the case, the level of the fluid in the chimney would vary as the outflow took place with greater or less rapidity, dependent on its blocking the passage more or less. The reporter thinks it desirable to introduce a description of this method into the report, so that it may be made use of in the case of other suitable volcanoes.

Report of the Committee, consisting of Prof. Ray Lankester, Mr. P. L. Sclater, Prof. M. Foster, Mr. A. Sedgwick, Prof. A. M. Marshall, Prof. A. C. Haddon, Prof. Moseley, and Mr. Percy Sladen (Secretary), appointed for the purpose of arranging for the occupation of a Table at the Zoological Station at Naples.

—In the Report read last year at Montreal it was announced that a scheme was on foot for the building of a large physiological laboratory in connection with the Zoological Station at Naples, and for the purchase of a new sea-going steamer, to be equipped as a floating laboratory. Your Committee are now able to report that both these projects are steadily advancing towards attainment. For the physiological laboratory the Municipality of Naples has made a grant of 400 square metres of ground, and the Italian Parliament has voted the sum of 50,000 lire towards the cost of building. In addition to this assistance from the Italian Government, a union of the maritime provinces of South Italy is about to be formed for the purpose of contributing towards the cost of the new laboratory, and of maintaining two tables there for the use of natives of the provinces concerned. The new steamship, which it is hoped will shortly be in the possession of the station, will form a further addition to the capabilities of the establishment. This undertaking is in the hands of an influential committee in Germany, organised for the purpose of collecting subscriptions, and by whom the vessel will be presented to the station. It is intended that the steamer should be of 300 to 400 tons burden, with engines of 150 to 200 horse-power, and be fitted up in all respects as a floating laboratory. With such a vessel it will be perfectly practicable to remain weeks or months in any desired locality, and distance from home will be no obstacle, as naturalists will live and work on board. Concurrent with these strides of the Zoological Station, improvements in the general management, in methods of work, and in instruments of research are constantly being made. The general efficiency of the establishment is so well known that it will suffice to say that the whole organisation of the station is in a state of active and prosperous vitality. The best evidence of this is furnished by the accompanying lists:—(1) of the naturalists who have occupied tables during the past year, and (2) of the publications resulting from work carried out at the station.

The General Collections.—Additions have been again received from Capt. Chierchia, who has, since the last Report, sent two collections of specimens from the Pacific and Indian Oceans. Other collections have been likewise received from Lieut. Cercione, Lieut. Orsini, and Lieut. Colombo, from the Atlantic, the Red Sea, and the Mediterranean respectively. Some of the material previously obtained by Capt. Chierchia has already been utilised by Count Béla Haller in a paper on the molluscan kidney, recently published; and the same author is at present preparing a monograph on the Patellæ. In like manner the Pteropoda have been investigated by Dr. Boas, of Copenhagen, whose monograph upon the subject is now in the press. Since the last Report the British Association table has been occupied by Mr. Wm. E. Hoyle, who, although limited in time, was enabled to prosecute researches on the embryology of the Cephalopoda, and to collect material from which important results may be expected. The report forwarded by Mr. Hoyle is appended:—

Report on the Occupation of the Table, by Mr. William E. Hoyle.—I reached Naples on April 6, 1885, and left on the 28th of the same month. In so short a time it was obviously impossible to make anything of the nature of a complete investigation in a subject of such magnitude and difficulty as the

embryology of the Cephalopoda; it seemed, therefore, that the opportunities afforded me could best be utilised by collecting material for subsequent examination. Of this I had an abundant and immediate supply, thanks to the kindly forethought of your secretary, who had given notice to the authorities of the station of the nature of the work I had undertaken, so that they had a quantity of ova ready for my use. The greater part of my time was spent in extracting embryos from the egg and preserving them in various fluids, and a fairly complete series of developmental stages of *Loligo* and a good many embryos of *Sepia* were thus obtained. When the young Cephalopods have reached a stage at which the rudiments of the arms are clearly visible, it is moderately easy, after a little practice, to extricate them by making an incision into the egg-membrane with a fine scalpel; but previously to this period they so nearly occupy the whole interior of the egg that it is almost impossible to obtain them uninjured. A quantity of such eggs I preserved whole by a method suggested to me by Dr. Jatta, who is at work upon a monograph of the Cephalopoda of the Bay of Naples. The strings of eggs are placed whole in weak solution of chromic acid (about 0.25 per cent.) for a few hours, and then in distilled water for twenty-four hours, after which they are preserved in alcohol. The embryos can then be extracted much more readily than when fresh. Some time was devoted to examining and drawing the embryos in the fresh condition, and in watching the process of segmentation in *Loligo* and *Sepia*. I observed the presence of the "Richtungsbläschen" in the former, which, so far as I am aware, has only been noted in a Russian memoir on the development of *Sepioida* by Ussow. A number of blastoderms in process of segmentation were preserved according to a method proposed by Ussow, for the knowledge of which I am indebted to Dr. Edward Meyer, who kindly translated it for me from the original. The egg, without removal of the membranes, is placed in 2 per cent. solution of chromic acid for two minutes, and then in distilled water, to which a little acetic acid (one drop to a watchglassful) has been added, for two minutes longer. If an incision be now made into the egg-membrane the yolk flows away and the blastoderm remains; if any yolk still cling to it, it may be removed by pouring away the water and adding more. The blastoderms thus prepared show, when appropriately stained, fine karyokinetic figures, of which I hope shortly to publish an account. The reduction of the collected embryos to serial sections and their examination will of course occupy some time, but I hope in a few months to prepare some account of the results obtained from them.

Report of the Committee, consisting of Prof. Huxley, Mr. Sclater, Mr. Howard Saunders, Mr. Thiselton Dyer, and Prof. Moseley (Secretary), appointed for the purpose of promoting the Establishment of Marine Biological Stations on the Coast of the United Kingdom.—The Committee has received the sum granted (£1500) from the Treasurer of the Association, and has paid it to the funds of the Marine Biological Association of the United Kingdom, as the most direct means of promoting the speedy establishment of a marine laboratory in a most favourable situation on the British coast—namely, Plymouth. An excellent site for a laboratory has been granted to the Marine Biological Association by Government, at Plymouth. A sum of 8000*l.* has been raised by subscriptions and donations, the Government has promised to aid the working of the laboratory by an annual subsidy, and there is every prospect of success. It is probable that the building of the laboratory will commence in November.

Report of the Committee, consisting of the Rev. Canon Tristram, the Rev. F. Lawrence, and Mr. James Glaisher (Secretary), appointed for the purpose of promoting the Survey of Palestine.—The Survey of Eastern Palestine has been carried on during the last year privately by Herr G. Schumacher, C.E., assisted by Mr. Laurence Oliphant, who has also furnished the Committee with valuable notes of personal exploration in the district now called Junlau—the ancient Gaulanitis. The portion surveyed by Herr Schumacher consists of about 200 square miles, and covers an area previously quite unknown. The map, which is now in the hands of the Committee, is accompanied by voluminous memoirs and a great number of sketches, drawings, and plans of ruins figured for the first time, which it is proposed to publish, with the memoirs, in October. The map of the Wady Arabah has been laid down in the Society's sheets; the geological memoirs compiled by Prof. Hule after his expedition of 1883-84 are nearly ready, and will be issued before the end of the year; and the Society has been enabled to secure Mr. Chichester Hart's

Remains of Century Plans

whether the facts so laboriously collected by Mr. Morgan can be used to throw light on the early history of the family.

From his plan of reprinting the book as it stood, with no more annotation than was absolutely necessary, the editor has departed only in one point. The appendix containing "additional examples of the form of capture" has been re-cast and enlarged upon the basis of a paper of J. F. McLennan published in the *Argosy* in 1866, but with additions from other and more accurate sources. The reasons for adopting this course are obvious: the new matter in this appendix could not conveniently have been reserved for the promised second volume, and the facts are so arranged and explained as to confirm the author's argument, and effectually dispose of the notion that the form of capture in marriage is to be explained by maidenly bashfulness.

It will be seen from this brief account that, sparing as the editor's additions are, they make the new edition of the "Studies" well worthy of the attention of those who already possess the book in its older form. And to the not small class of students of early society who know McLennan's work only at second hand or by one hasty perusal, it may not be unprofitable to say that this is emphatically a book of which a general knowledge is not sufficient, inasmuch as some of the most important and interesting points are precisely those which are almost sure to be missed on a first reading. For this, perhaps, McLennan himself is partly responsible, for in giving to "Primitive Marriage" the subordinate title "an inquiry into the origin of the form of capture in marriage ceremonies," he seems to fix attention on what is only the starting-point of a far-reaching research. In print and in conversation one often meets with the notion that the doctrines of marriage by capture and kinship through women only are mere archæological *curiosa*, and that for the study of later law and custom it is quite indifferent whether these things are true, or whether, on the contrary, mankind started from the first with male kinship. But the importance of McLennan's researches lies largely in the demonstration that the structure of society under a system of kinship in the male line which has been preceded by kinship through women cannot be the same as would be reached by a race which has had male kinship from the first. Other writers have taught a doctrine of the priority of kinship through women, but no one except McLennan has accurately developed the consequences of the doctrine, and shown how it solves a problem which, though ignored by most writers, is of the highest importance, namely, the origin of *gentes* within a nation. Like all really original thinkers, McLennan has for one of his chief merits that he recognised the existence of difficult problems in matters which ordinary people pass over without seeing any difficulty at all. And therefore precisely those passages in his writings which on a hasty reading seem needlessly laboured and proper to be skipped are found upon re-perusal to be particularly useful and stimulating.

A word may be said in conclusion on what is promised for the second volume. It is satisfactory to know (p. 75) that it will include a short essay on the origin of exogamy. And from a note at p. 176 it may be inferred that in this essay the origin of exogamy will be sought in a state of

society where marriage by capture was an established custom. We are also promised (p. 63) an essay on the marriage law of the Australian Kamiraloï, one of those highly complex problems in which McLennan's powers of analysis ought to appear at their best. From notes on pp. 109 and 228 it appears that part at least of McLennan's hitherto uncollected essays in the *Fortnightly Review*, including the papers on Totemism, or "On the Worship of Plants and Animals" (1869-70), will also be republished. It is to be hoped that in these reprints the editor will allow himself, in one direction, greater freedom of annotation than in the present volume. The Totem papers are in some respects the least finished of McLennan's writings, the evidence of totemism in the nations of ancient civilisation being much too largely drawn from second-hand sources. This gives an appearance of weakness to the whole structure of the argument, which has been very prejudicial to the influence of a most original and striking investigation. In point of fact a few of the detailed pieces of evidence ought to be abandoned altogether, but enough remains to leave the substance of the argument unaffected, and this ought to be clearly brought out by notes, referring to original authorities of unquestioned reputation, or giving up statements that cannot be authenticated. Even in the present volume one misses some notes of this kind. The polyandria of the Athenians (p. 235) rests on better evidence than the story which Augustine cites from Varro (Clearchus *ap.* Athen. xiii. p. 556 d.). Again, the note at p. 47, in which an attempt is made to prove the existence of the form of capture among the Hebrews from the phrase "to take a wife," ought rather to have been withdrawn than again built upon by the editor at p. 181; and what is said of the marriages of the Persians at p. 219 *sq.* requires careful revision.

W. ROBERTSON SMITH

BRITISH HYMENOMYCETES

British Fungi, Hymenomyces. By Rev. John Stevenson. With Illustrations. Vol. II. Cortinarius—Dacrymyces. Pp. 336. 8vo. (Edinburgh: William Blackwood and Sons, 1886.)

WE are glad to welcome this second volume so speedily after the first, although we fear that expedition has been secured by some sacrifice of efficiency. It is a misfortune when the reader is impressed at once with the feeling that a volume has been hurried out to meet certain exigencies. That feeling is by no means absent in scanning these pages. As soon as p. 165 is reached, and there is no longer Fries's "Monographia" to fall back upon, *descriptions* give place to *diagnoses*, notwithstanding the remarks in the preface, which would seem to regard diagnoses with something of contempt. From p. 166 to the end the *student* must be content with the diagnoses from Fries's "Hymenomyces Europæi," although there might have been collected together valuable notes from Fries's "Systema," "Observationes," and "Elenchus." Nevertheless some advantage has been taken of the few descriptions published in the letterpress to Fries's "Icones."

It is of considerable importance to students that a work which professes to include all British species, up to date, should satisfy all reasonable expectations. The first

McLennan

out of the five cases it was dust alone. In four out of the five cases the immediate cause was shot-firing, *but in no instance was the shot blown out*. It is not at all necessary that the shot should be blown out to cause the ignition of the dust-cloud which the concussion raises in a dusty road. Properly fired shots show flame even when they dislodge the stone or coal; and the flame is often considerable if there has been an overcharge of powder, or if small coal or earth mixed with coal-dust has been used, as frequently happens, in the tamping. At Seaham, Tudhoe, West Stanley, and Usworth the flame of the shot ignited the dry inflammable dust dislodged from the roof or raised from the floor by the concussion of air which followed, and the explosion was propagated by fresh dust-clouds raised in the manner described by the Royal Commissioners. At Trimdon Grange an explosion of fire-damp operated in the same way: the violent movement of air resulting from the ignition of fire-damp and air raised a cloud of coal-dust into which the flame from the fire-damp passed, and the ignition of the coal-dust propagated itself as in the other cases, and, as in these, continued so long as it was fed by fresh fuel. This rapid ignition of dust containing upwards of 80 per cent. of carbon would result in the formation of large quantities of carbonic acid, and possibly even of the more poisonous carbonic oxide: when it is considered that it is impossible to live in air containing even $3\frac{1}{2}$ per cent. of carbonic acid, the deadly character of the after-damp so formed is readily conceivable.

In striking contrast to the Durham explosions was that at Whitehaven. This was in a wet pit; the coal being worked was wet, and all the surroundings were damp, and free from dust. The cause of the explosion was gas, which was known to be in the pit, and frequently present in large quantities. Although it is probable that some 30,000 cubic feet of an inflammable mixture of air and fire-damp were ignited, the explosion was confined to a limited area of the workings, which extend to nearly three miles from the shafts. Seven men were within the district of the explosion, of whom three escaped. The survivors stated that all the men were alarmed by the appearance of gas immediately before the explosion, and hurried away. In the act of retreating the gas ignited at a lamp which was afterwards proved to have been defective and to allow of the passage of the flame. This the authors say was the most considerable explosion of fire-damp and air that they are acquainted with. They have personally investigated during the last twelve years almost all the explosions occurring in the North of England, and they cannot point to a case where there was direct evidence of so large a quantity of fire-damp and air exploding.

The moral of all this is obvious. It can scarcely be gainsaid that some of the most disastrous explosions of the last thirty years are primarily to be attributed to the practice of firing gunpowder in dusty mines. That under certain circumstances gunpowder can be used with safety is allowed. But the Royal Commissioners have issued a warning in no uncertain terms. They have convinced themselves that the abolition of the use of powder in dry and dusty mines will not generally involve any formidable inconvenience, inasmuch as the work which is accomplished by its employment both in coal and in stone can now be performed with equal efficiency, and at very little

if any greater outlay, by other means. Unless, therefore, mining engineers, or those immediately responsible for the working of collieries, can devise some satisfactory method of minimising the danger due to dust, they will be compelled before very long, in deference to public opinion, to renounce the practice of blasting by means of gunpowder, or by any other agent which causes a flame.

T. E. THORPE

McLENNAN'S "STUDIES IN ANCIENT HISTORY"

Studies in Ancient History: comprising a Reprint of "Primitive Marriage." By the late John Ferguson McLennan. A New Edition. (London: Macmillan and Co., 1886.)

THE first edition of "Primitive Marriage" appeared in 1865, and the book was already extremely rare when, in 1876, it was reprinted as the first part of the "Studies in Ancient History." The reprint also soon became scarce, and while the influence of the author has been steadily growing, and almost all students of early society have come to attach great importance to his speculations, his principal writings have for some years been almost inaccessible. This new edition therefore supplies a real want, and it is doubly welcome for the sparing, but judicious, notes and appendixes which the editor, Mr. D. McLennan, has attached to his brother's book. "Primitive Marriage" broke ground in a new field of research, and, as the point of view was wholly novel, the collection, sifting, and marshalling of the evidence on which the argument was based was entirely pioneer's work. At the close of his life, McLennan was in possession of a much larger material; he had pursued his argument in new directions and to further conclusions, and on one or two points he had come to change his views. But new research had only confirmed the main lines of the argument sketched with so firm a hand in his original essay; and read with the *caveats* which his brother has introduced at one or two points—chiefly as regards the interpretation of the Levirate, and the prevalence of Agnation—the present reprint may be taken as generally representing, so far as it goes, the author's final conclusions on the subjects discussed. I say *so far as it goes*, for in many directions his conclusions had been added to and his views developed. The editor promises us a second volume, to consist for the most part of writings hitherto unpublished, which will throw a good deal of light on these new developments; meanwhile he has restricted himself in the notes "to certain matters on which the author had announced a change of view, and to certain others where circumstances had made an additional statement imperative." Of the additional statements, the most important is contained in two long notes appended to the essay on Morgan's "classificatory system" of relationships, in which it is clearly made out that Morgan's theory rests on misconception of the facts, and that the supposed classificatory system of relationship is not a system of relationship at all, but a system of terms of ceremonial or friendly address, used in conversation even between persons who are not related to one another in any way. This comes out so clearly in the cases about which we are best informed, that it is very questionable

Vesuvius

with Europeans since the end of the sixteenth century. M. Hamy referred in detail to the manners and industry of this people. (4) This is a slightly heterogeneous group, consisting of the Obambas, Ondumbas, &c., who live in the neighbourhood of Franceville. In conclusion the speaker referred to the interest of ethnological research in relation to the movements of peoples on the earth's surface. Here, he said, ethnography is especially bound up with geography.

The Portuguese explorers, Col. Serpa-Pinto and Lieut. Cardoza (according to the *Colonies and India*) recently left the Cape Colony for Lisbon. These gentlemen have accomplished a most important scientific exploration in the Lakes region. Leaving Mozambique, they proceeded by land to Ibo, correcting many errors that had crept into the charts. From Ibo they advanced to Nyassa at the head of an Expedition 800 men strong, making as they went a geodetical triangulation of the country, using instruments of great precision. Col. Pinto, in consequence of a dangerous attack of illness, was obliged to leave the Expedition in Mebe's country, of which he had made a geological survey, occupying a long time. Lieut. Cardoza, who had been blind for fifty days, happily recovered his sight in time to take the command of the Expedition, continuing the work to Nyassa, from whence he went to Shirva and Blantyre, and by a new road to Quilimane. The whole party suffered from hunger on the way; all the dogs died of starvation, and the men narrowly escaped the same fate. The Expedition was accompanied by 200 Zulus, who rendered splendid services, being conspicuous for their courage and devotion. Besides their scientific work, the first of the kind done in that part of Africa, the leaders of the Expedition extended the Portuguese dominion over all the important chiefs visited during the journey, lasting twenty months. Everywhere the Expedition was heartily welcomed by the natives, the only place where the Mission was not cordially received being, it is said, the Blantyre Mission Station.

THE September issue of the *Scottish Geographical Magazine* contains a paper by Prof. Meiklejohn on the history, poetry, and geographical names. Mr. Murray, of the *Challenger* Expedition, reviews the existing state of our knowledge of the Antarctic regions *à propos* of the project for exploring them. The Council have unanimously resolved to support any movement having for its object the careful exploration of the Antarctic regions, "as being certain to result in large and important accessions to our knowledge in geography, oceanography, meteorology, and other branches of physical science." They think the expedition should be undertaken at Government expense, but the co-operation of Australasian Governments might be invited. They suggest a conference of delegates of the leading scientific Societies to draw up a memorial to the Government on the subject.

ACCORDING to the latest intelligence received at Zanzibar from the interior of Africa, Dr. Wilhelm Junker, the African traveller, was at Msalala, south of the Victoria Nyanza, and was about to start for Zanzibar. Emin Bey was still at Wadely, and was in urgent need of supplies of ammunition and stores. The King of Uganda had murdered all the English and French converts, and the missionaries were in great danger and had asked for assistance.

PROF. BLUMENTRITT contributes to the last number of *Globus* (vol. I. No. 14) an interesting article on the Manguians of the island of Mindoro, in the Philippines, based on a Spanish work by Don Morera on the geography and natural history of that archipelago. Next to Luzon and Mindanao, Mindoro contains the greatest number of wild tribes. Those which live on the coast and along the banks of the rivers are known under the general name of Manguians, while the Bangot inhabit the plateaus, and the Buquil and Beribi have their villages amongst the high mountains of the interior, but these names vary greatly in different parts of the island. They exhibit a mixture of various races. Besides the Malay, there is Negrito blood in the Buquils, and in some places traces of Chinese descent also. Prof. Blumentritt confines himself to describing the manners, customs, dress, &c., of the Manguians. Incidentally, however, the paper tends to show the enormous complication and difficulty of ethnological questions relating to the Philippine Islands. The constant mingling of different races from China, Malaya, and parts of Melanesia and Polynesia has created a mixture of which the component parts are almost indiscernible. The vast variety

of names given to tribes, which rarely mark any ethnical distinction, and which sometimes are given to the members of the same tribe, add to the confusion.

NOTES ON VESUVIUS FROM FEBRUARY 4 TO AUGUST 7, 1886

IN NATURE (vol. xxxiii. p. 367) I gave a description of the changes that had taken place in Vesuvius during the preceding months, and of the eruption of February 4. The lava that issued on that occasion continued to flow in abundance until the 11th, forming a brilliant streak on the northern slope of the cone. After that date the output of fused rock varied at intervals till about the end of the third week in March, when the outflow stopped.

On April 21, at about 5 p.m., lava rose from that portion of the fissure crossing the great crater plain on its south side, and which was the one by which the eruption of May 2, 1885, had taken place. The quantity that oozed out was comparatively small, and sufficed only to flow down the side of the great cone for about 100 metres, so as to just cover the point of exit of the lava that had issued from the same fissure in the spring of 1885. The new lava piled itself up into a kind of boss, and thus soon plugged its own passage.

A few days after, that is, on April 27, a new outburst occurred, again at a weak point—the upper limit of the fissure of 1881–82, above the buttress of lava formed subsequent upon that eruption. This was sufficient to carry off the overflow for some weeks. Slight variations, such as are constantly going on, were observable in the activity of Vesuvius and the outflow of its lava during the whole of the month of May. During the eruption of Etna, Vesuvius did not show the slightest sympathy—just what we should expect when our conception of a lateral outburst is that it is simply a mechanical result of changes that proceed in the upper part of the volcanic chimney, and usually of the mountain itself.

During the month of June the outflow of lava on the eastern side persisted, adding to the great boss, hump, or buttress formed during the years subsequent to the eruption of 1881–82. Owing to the height of the lateral outlet, and probably also from its narrowness, the level of the lava column in the chimney was very high, and, as a consequence, the numerous pasty lava-cakes added much to the size of the eruptive cone, which grew so rapidly during the month as to cover all the old remnants of crater-rings except a small portion of the northern rim of that of 1881–82. On June 29, when I visited the crater, I found a long continuous fissure extending right across the great crater plain in a westerly direction, and emitting an abundance of hot air, HCl, with vapour of chlorides, which were deposited in feathery bunches on the cooler edges of the fissure. This fissure no doubt corresponds to the upper limit of a radial dyke, as did the one existing for many months previous to the eruption of May 2, 1886, and probably does, like that one, indicate the direction of an eruption at some future time. When such an eruption takes place it will be unpleasant for the funicular railway, which, although a little south of the line of fissure, would be within reach of the outburst. In the above-mentioned visit it was possible to watch the eruptive mouth for some time from the edge of the cone of eruption, and to take an instantaneous photograph of it amidst an exciting bombardment of stones, not dangerous for one's self, but unfavourable to an inactive photographic camera. Unfortunately an accident happened to the negative, but I have since been successful in obtaining a permanent record of the eruptive mouth, though hardly such a successful picture. The diameter of the main vent was about 3 or 4 metres, and nearly circular.

The crater was again visited on June 5, but no marked change had taken place, and lava was always issuing on the east side and flowing first to one side and then to the other, always adding to the great buttress.

The cone of eruption, owing to its great increase of size during the last thirteen months, formed a very conspicuous mound, perched as it were on the flattened summit or crater plain of 1872, which truncates the great cone of Vesuvius. On June 28 it was observable from Naples that the cone was falling in, and the spine or boss forming the northern boundary of the crater of eruption had in part disappeared, and owing to the plugging of the passage the smoke only escaped in puffs. This crumbling in of the crater walls was no doubt due to the loss of

support of the column of lava within the chimney. This lowering of level probably produced the extension outwards of the eastern dyke, and the lateral outlet of lava was consequently lowered. This was confirmed by the much increased outflow of lava coincident with the falling in of the cone.

During the first week in July the volcano appeared from Naples to be very quiet; indeed, less vapour was escaping from the summit than at any time during the last seven years. From time to time the vapour was, from the gradually increasing pressure, able to burst its way through the loose materials that choked the outlet, when a puff of smoke would be visible of a dark purplish-black colour, due to its being charged with volcanic ash derived from the churning up and trituration of the lava fragments, scoria, and lapilli it had to traverse in its escape. At the same time a slight reflection was to be seen at night, indicating that the lava surface, although lowered, was not so to any great extent.

On this day, July 8, the lava which had always been gradually advancing, had crossed the southern end of the Val d'Inferno, and flowing down one of the wooded ravines on the property of the Prince of Ottajano, where it destroyed a number of trees, it continued its course, overwhelming some vine-gardens. On July 12 the number and quantity of the black smoke puffs was very great, and the crater was in the full ash-forming stage, and towards night the vent had been considerably cleared, so that the reflection was well marked. The next day the smoke issued freely and uncharged with ash. The change that took place on the 12th was no doubt due to the lava rising in the chimney consequent upon the lateral outlet getting choked; as on the 11th, the abundant flow of lava became very much diminished.

On July 20 the puffs of dark smoke again appeared, indicating a return of the crumbling in of the crater; this was again due to the lowering of the lava level, and, as was expected, the fluid rock issued in great abundance the following day, again destroying trees and vine-gardens. The next day the lava was still flowing in abundance, so as to form a bright streak on the slope of the great cone. The outflow continued to gradually diminish until the 30th, the crater above remaining inactive. On the latter date, however, the lava rose again sufficient within the chimney to cause the vapour to find a passage through the materials choking the main vent, so that on that day the puffs of black smoke were again abundant, and accompanied by the ejection of partially trituated subangular old lava and scoria fragments. In the evening bright bursts were well marked, showing that the vent was again cleared. The two following days the volcano maintained the third degree of activity (*Rep. Brit. Assoc.*, 1885, p. 395).

During the first week of August the lava again flowed rather freely from the mountain's side, whilst from its summit hardly any vapour escaped except from time to time a puff of black smoke. On August 7 a visit was paid to the crater. The cone of eruption has been reduced in height about 30 metres, and its remnants form a low crater ring inclosing a crater of oblong form having a diameter of about 80 X 60 metres. Its greater axis lies in a line from about E.S.E. to W.N.W., and its bottom is double, so that it seems to result from two craters closely overlapping each other. The crumbling-in process was still going on, and the trituration of the loose stones and the charging of the vapour puff by the ash or sand could be watched from a distance of a few yards. I was successful in obtaining two ordinary and two instantaneous photos of the interior of the crater, only the eastern half of which, however, was active.

The principal facts that may be gathered from the study of the phenomena of Vesuvius during these few months are rather confirmations of what the author has described as the mechanism of lateral eruptions, which may be summed up thus. The lowering of lava level within the chimney due to a lateral outlet removes the support the former gave to the walls of the crater and vent, which in consequence tumble in and choke more or less of the main outlet. Next the vapour contained in the lava may be compelled to escape laterally, but has a natural tendency not to do so, but rather to seek its path straight upwards. If the lateral outlet becomes choked, the lava immediately commences to rise in the chimney, and the escaping vapours burst through the loose materials in the chimney in puffs, grinding and trituating them, carrying upwards their dust, which tints the smoke of a dark colour, and, falling around the volcano, constitutes one of the forms of "volcanic ash," the chemical composition of which represents that of all the rocks trituated plus the saline substances condensed from the smoke. If one

walks across this ash when damp, one may notice the immediate plating of their boot-nails with copper, showing the abundance of the chloride of that metal. H. J. JOHNSTON-LAVIS

THE ADELAIDE BOTANIC GARDEN AND GOVERNMENT PLANTATION

THE report of Dr. Schomburgk on the progress and condition of the Botanic Garden and Government Plantation, Adelaide, during the year 1885 has just reached us. Speaking first of the rainfall, Dr. Schomburgk says that the year was one of the driest and most ungenial that he ever had to contend with, the rainfall being no more than 15·887 inches, which was 2·851 inches less than the fall of 1884, and 5·272 below the average rainfall during the previous forty years. During September, October, November, December, and January no more than 3 inches of rain fell, and the heat during these months was abnormally great. The drought and heat combined had an injurious effect upon the vegetation, especially upon many of the trees and shrubs in the Botanic Garden, natives of cooler countries; the losses sustained, however, were not so great as was expected, owing to an abundant supply of water. On the other hand, in May and June severe frosts were experienced, so that tropical and sub-tropical plants and shrubs suffered greatly.

On the question of the introduction and acclimatisation of new economic plants, Dr. Schomburgk records his experience with many that have been widely distributed through the agency of the Royal Gardens, Kew, and have become known and established in other colonies as well as in India, such, for instance, as the Kumara (*Ipomoea chrysorrhiza*), the tubers of which form an article of food in New Zealand. Dr. Schomburgk says he believes that the plant will grow well in the gullies, because the climate there is cooler and moister than on the plains, and to some extent approaches that of New Zealand. The Gingly oil plant (*Sesamum indicum*) is also reported upon favourably. The seeds were sown in drills in the open ground in October, and came up in about fourteen days. Considering that neither the dry spring nor the summer heat affected the plants, there seems no doubt that the species can be successfully cultivated in South Australia. The plant is an annual, and is very largely grown in warm countries for the sake of the sweet limpid oil now so much used for mixing with olive oil.

Under the head of *Rhopala* sp. an announcement is made of the receipt from Kew of a parcel of seeds of a tree belonging to the above-named genus, a native of Columbia, with the following extract from a letter of Mr. W. T. Thiselton Dyer:—"The *Rhopala* is a small contorted tree growing to about twenty feet in height. It is remarkable for being absolutely indestructible by fire, in large districts where the dry pastures and bush are burnt twice a year. Its resistance to fire enables it to exist to the exclusion of all other trees and bushes as a perfect natural plantation. The periodical burning destroys everything except this tree. The resemblance to a plantation is moreover enhanced by the circumstance that the trees never form thickets, and they are thickly and almost systematically dispersed over the land. The tree delights in the most sterile soils, but always of a stony or shingly character. Sometimes it grows in places so barren that even grass cannot exist. This suggests the idea that it may be turned to account in sterile districts within the tropics." Dr. Schomburgk expresses some doubt whether the plant will thrive out of doors with them, but thinks it may do well in the Northern Territory.

The Herbarium and Museum have both been considerably enriched by additional specimens during the year, so that the utility and efficiency of the whole establishment are thoroughly maintained.

THE AMERICAN ASSOCIATION

FROM the report in *Science* of the Buffalo meeting of the American Association we condense the following brief summary:—

Prof. Gibbs's masterly address, in the Section of Mathematics and Astronomy, upon the subject of "Multiple Algebra," was too long and of too technical a nature for presentation in full to our readers. His opening remarks were as follows:—

"It has been said that 'the human mind has never invented a labour-saving machine equal to algebra.' If this be true, it is but natural and proper that an age like our own, characterised

to several times their original length. In the same sandstone quartz pebbles have been pulled out and flattened, while sericite has been largely developed along the cleavage planes. The pressure can be shown to have been directed mainly from the south-east. (2) The second locality is in the midst of the Laurentian area of Buck's County, and is known as Van Artsdalen's Quarry. A mass of crystalline limestone is here mingled with an eruptive diorite in such manner as to show that it had actually flowed like an igneous rock, and had caught up inclusions. The results of extreme metamorphism are exhibited in the development in the limestone of graphite, wollastonite, and other minerals. The chemical changes and interchange of elements which might result from a loosening of molecular combinations under extreme pressure and their subsequent "regulation" into new compounds were discussed as among the phenomena of mechanical metamorphism. (3) As an American instance of the conversion of an intrusive diabase dyke into amphibolite schist, analogous to the case recently described by Teall, a long narrow belt of sphene-bearing amphibolite schist in the City of Philadelphia was adduced. This belt with distinctive mineralogical characters cuts across the metamorphic mica schists of the region unconformably, and is believed by the author to be a highly metamorphosed intrusive dyke of Lower Silurian age. The original augite or diallage has been completely converted into fibrous hornblende, and the influence of pressure is shown in the perfectly laminated character of the schist in the close foldings produced, and in the minute structure of the rock. Some interesting details of the latter having been photographed, diagrams constructed from these were exhibited. These showed that the rock was traversed by a parallel series of slips and crushings, and that about such lines of faulting and crushing there was a peculiar arrangement of the lines of hornblende crystals, not very unlike the arrangement of iron filings about the poles of a magnet, such as could not be satisfactorily explained by any theory of aqueous deposition, but pointed to a lamination by pressure.

SECTION D—BIOLOGY

On the Cause of the extreme Dissimilarity between the Faunas of the Red Sea and Mediterranean notwithstanding their recent connection, by Prof. Edward Hull, LL.D., F.R.S.—The faunas of the Mediterranean and of the Red Sea are so unlike that if the beds of the two seas were upraised, and their contents examined, naturalists would probably refer them to distinct geological periods. The dissimilarity is greater than was formerly supposed. In Woodward's "Manual of the Mollusca" it is stated that seventy-four species of mollusks are common to the two seas, but Prof. Issel, of Genoa, places the number at eighteen, or about 2 per cent. Equal differences exist if we compare other great groups of life; in fact, as Prof. Haeckel well observes, the fauna of the Red Sea is related to that of the Indian Ocean, the fauna of the Mediterranean to that of the Atlantic. This extreme dissimilarity would not surprise us if it were not for the proofs of recent connection between the two seas. Evidence of old sea margins, up to about 220 feet above the present sea-level, are frequently found along the Nile and in the valleys and plains of Philistia. As many of the marine forms found in these deposits still exist, the date of the submergence may be safely referred to that of the Pliocene; but it continued to a later period, and (in the author's opinion) it to some extent remained to the time of the Pharaohs. The existing fauna probably date back to Eocene times, when the ocean spread widely over the area in question. In the Miocene period the main outlines of land and sea as we now find them were marked out, the deposits of this age being here small and local. Under the extremely different conditions existing in the two areas, the fauna during and after the Miocene period became differentiated. The connection re-established during and after the Pliocene period was insufficient to destroy these differences, although it allowed a mingling of forms to some extent. The maximum submergence was about 220 feet; but as the summit level between the two seas is about 50 feet, the depth of water would only be about 170 feet at the maximum. Only littoral and shallow-water forms would cross in the adult state; but many forms inhabiting deeper water in the adult state might have crossed when in the free-swimming larval state. When the land again rose, and the marine straits were finally effaced, the different physical conditions of the two seas would again come into effect. The difference

of temperature is now very considerable, and probably was much greater during the Glacial period, especially if, as appears probable, the eastern or Levant basin of the Mediterranean were separated from the others; for into this would flow the cold waters of the Black Sea and of Central Europe, whilst the Red Sea would receive warm water, and be itself exposed to the rays of a tropical sun. It would be an interesting subject of inquiry—Which of these faunas most closely resembles that of the original stock?

On the Tay Whale (Megaptera longimanus) and other Whales recently obtained in the District, by Prof. Struthers.—Prof. Struthers gave a description of the various parts of the anatomy of the whale. In addition to the Tay whale members of three other whales recently obtained in the district were exhibited for the purpose of comparison, and the analogy of its structure to that of other animals was specially referred to in order to show its identity with the mammal. Prof. Flower joined in the discussion which followed, and remarked that they now had an idea at least as to the origin of the whale: it carried its pedigree in every part of its body. It had been thought that the mammals that live upon land had been derived from progenitors that formerly lived in the sea, and that the mammals may have passed through an aquatic or marine stage before they took to land, but the observations of anatomy showed that this cannot have been the case. There was no doubt that the whale had been derived from a four-footed land mammal. All observations, for example, had shown that at some period of their life whales have a hairy covering, generally in the region of the mouth, that hairy covering being functionless and very often lost even before birth. In the same way whales at an early stage of their existence are furnished with a complete set of teeth, the rudiments of the teeth of the land mammal. The organ of smell, although in a rudimentary state and in some species almost entirely gone, also points to the origin of the whale.

Some Points in the Anatomy of Sowerby's Whale, by Prof. Turner.—Prof. Turner remarked that *Mesoplodon bidens*, or Sowerby's whale, of which he had dissected two specimens, was now for the first time dissected so that the viscera of this whale were seen by any anatomist, or that its tail and paddle, or fin, had been figured. The tail presents a very material difference from the customary tail in the cetacea in having the posterior border smooth instead of notched. Dr. Turner called attention in detail to the intestinal and limb structure of this species of whale, showing the affinity or resemblance of the cetacea to the reptilious and the amphibious, particularly in reference to the corpus. Prof. Flower said he was glad to find that Prof. Turner had found some intention for the muscles of the corpus. For all that they were very rudimentary as compared with the same muscles in other animals, and he thought that he might have to modify his views on this point as he had had to do in regard to many other things throughout life. Prof. Marsh, of Yale College, said the intermediary bone pointed out by Prof. Turner interested him much.

On the Cervical Vertebrae of the Greenland Right Whale, by Prof. Struthers.—The reduced condition of the upper and lower transverse processes was commented on, and the meaning of their different parts explained; also the completely fused condition of the bodies of the seven vertebrae. A nearly similar condition of the neck of the Pilot Whale (*Globicephalus melas*) was demonstrated, showing in the young condition the two body epiphyses on the rudimentary vertebrae. Other specimens illustrated the fibrous condition of the transverse processes in the Narwhal and Beluga.

On the Development of the Vertebrae of the Elephant, by Prof. Struthers.—The point was that in the anterior vertebrae the neural arches meet behind the body, covering it deeply, and shutting it entirely out from forming any part of the wall of the spinal canal.

On the Development of the Foot of the Horse, by Prof. Struthers.—Dr. Struthers called attention to the fact that the epiphysis of the rudimentary metacarpal and metatarsal bones is not at the upper or functional end, but at the reduced end or "button," from which only a slender ligament proceeded. This he considered a most interesting fact, one which completed the chain of evidence of the descent of the horse. There was a reason why the epiphyses should be there in the hipparion and previous forms from which the horse of the present day was descended. The development of the corresponding bones in man, the cetacea, and various other mammals, was given in illustration.

Prof. Flower
 Prof. Marsh
 Prof. Turner

mica and quartz, are developed. The most intense mechanical metamorphism occurs along the grand dislocation (thrust) planes, where the gneisses and pegmatites resting on those planes are crushed, dragged, and ground out into a finely-laminated schist (*Mylonite*, Gr. *mylon*, a mill) composed of shattered fragments of the original crystals of the rock set in a cement of secondary quartz, the lamination being defined by minute inosculating lines (fluxion lines) of kaolin or chloritic material and secondary crystals of mica. Whatever rock rests immediately upon the thrust-plane, whether Archæan, igneous, or Palæozoic, &c., is similarly treated, the resulting mylonite varying in colour and composition according to the material from which it is formed. The variegated schists which form the transitional zones between the Arnaboll gneiss and Sutherland mica-schists are all essentially mylonites in origin and structure, and appear to have been formed along many dislocation planes, some of which still show between them patches of recognisable Archæan and Palæozoic rocks. These variegated schists (Phyllites or Mylonites) differ locally in composition according to the material from which they have been derived, and in petrological character according to the special physical accidents to which they have been subjected since their date of origin—forming frilled schists, veined schists, glazed schists, &c., &c. The more highly crystalline flaggy mica-schists, &c., which lie generally to the east of the zones of the variegated schists, appear to have been made out of similar materials to those of the variegated schists, but to have been formed under somewhat different conditions. They show the fluxion-structure of the mylonites; but the differential motion of the component particles seems to have been less, while the chemical change was much greater. In some of these crystalline schists (the augen-schists) the larger crystals of the original rock from which the schist was formed, are still individually recognisable, while the new matrix containing them is a secondary crystalline matrix of quartz and mica arranged in the fluxion-planes. While the *mylonites* may be described as microscopic pressure-breccias with fluxion-structure, in which the interstitial dusty, siliceous, and kaolinitic paste has only crystallised in part; the *augen-schists* are pressure-breccias, with fluxion-structure, in which the whole of the interstitial paste has crystallised out. The *mylonites* were formed along the thrust-planes, where the two superposed rock-systems moved over each other as solid masses; the *augen-schists* were probably formed in the more central parts of the moving system, where the all-surrounding weight and pressure forced the rock to yield somewhat like a plastic body. Between these augen-schists there appears to be every gradation, on the one hand to the mylonites, and on the other to the typical mica-schists composed of quartz and mica. Like the mylonites, the crystalline augenites and micallites present us with local differences in chemical composition (calcareous, hornblendic, quartzose, &c.), suggestive of Archæan, igneous, or Palæozoic origin. They also show similar structural varieties due to secondary physical changes (frilled, veined, glazed, &c.), as well as others due to the presence of special minerals (garnet, actinolite, &c., &c.).

On certain Diatomaceous Deposits (Diatomite) from the Peat of Aberdeenshire, by W. Ivison Macadam, F.C.S., F.S.C., &c., Lecturer on Chemistry, School of Medicine, Edinburgh.—The material was found below the peat in certain districts of Aberdeenshire, but principally in the basin in which lie Lochs Kinnord and Dawin. After removal of the surface peat-fuel, the lower and more highly mineral portion was cut in blocks and air-dried. The substance then consisted of almost pure Diatomacea bound together by the remains of Spragnum, Equisetacea, &c. Besides being found underlying peat the substance was also obtained on the shores of Loch Kinnord, and the more pure Diatoms were thickly distributed over the bottom of the deeper portions of the lake; these latter, however, from the want of the binding obtained from the marsh plants above mentioned could not be rendered readily available for market. An interesting point regarding these deposits was that whilst in Loch Kinnord an abundant supply of the Diatoms could be obtained, in the neighbouring Loch Dawin scarcely a single Diatom (recent or fossil) was found. This was probably due to the fact that whilst the feeding waters of Loch Kinnord flowed from hills consisting of a coarse and much disintegrated granite, and consequently contained a considerable portion of soluble silica, the Loch Dawin waters were obtained from hornblendic mountains, and held much less soluble silica in solution. The material was principally used for the manufacture of dynamite, and a considerable quantity had been forwarded to the works for this

purpose. Unfortunately, however, dynamite had fallen to a great extent out of use, being replaced by the more powerful blasting gelatine, and thus what had at one time appeared as if it would prove an important local industry had entirely fallen away. Other uses, however, could be found for the material, such as the manufacture of ultramarine, for which, from the very small proportion of iron present, the diatomite has more especially to be recommended. As an absorbent it was of fully double the value of the ordinary German varieties of "kieselguhr."

On Some Recent Earthquakes on the Downham Coast, and their Probable Causes, by Prof. G. A. Lebour, M.A., F.G.S.—For the last two years frequent slight shocks, resembling those of earthquakes, and accompanied by rumbling noises, have been felt at Sunderland. Much discussion has arisen as to the cause of these, but that they are due to natural causes is now quite certain. Sunderland stands upon magnesium limestone, from 300 to 400 feet thick beneath the town; the rock is riddled with cavities of every size, some so small as to give a vesicular character to the stone, some large and forming true caverns. These cavities are partly due to the washing out of marly matter, partly to solution of the limestone. Every thousand gallons of Sunderland water contains one pound of stone; in this manner about forty cubic yards of magnesian limestone are yearly pumped up by the Water Company, and of course a much larger quantity is removed by natural channels. This action enlarges the cavities; the sides and roof fall in, thus accounting for the shock. The same explanation applies to the "breccia gashes" which are exposed along the shore. These are fissures filled with breccia. Quite recently similar shocks to those here referred to have been observed at Middlesborough. Pumping the brine from the salt deposits, 1000 to 1200 feet below the surface, may produce cavities into which the rock falls.

Some Examples of Pressure-Fluxion in Pennsylvania, by Prof. H. Carvill Lewis.—The three localities in Pennsylvania described in this paper lie in an area which had been especially studied by the author for some years back and had led him to conclusions similar to some of those recently announced as the result of studies in North-Western Scotland, which have justly attracted widespread attention. (1) a zone of ancient crystalline rocks extends across South-Eastern Pennsylvania, near Philadelphia, which is generally believed to underlie the lowest Cambrian strata and to be of Archæan age. This zone is about a mile wide where it crosses the Schuylkill River, south of Conshohocken, and it is from this point to Westchester, some twenty miles westward, that the present remarks especially apply. Although in many portions exhibiting a distinct gneissic lamination, the rocks of this zone are held by the author to be of purely eruptive origin, consisting of syenites, acid gabbros, trap granulites, and other igneous rocks, often highly metamorphosed. It is the outer peripheral portion of this zone to which attention is here directed. While the rocks are massive in the centre, this outer portion has been enormously compressed, folded, and faulted, with the result of producing a tough-banded, porphyritic *fluxion gneiss* identical with the "milonite" of Lapworth or the "sheared gneiss" of Peach and Horne. So perfect is the fluxion structure that the rock resembles a rhyolite. As in the "banded granulite" of Lehmann, elongated feldspar "eyes" lie in flowing streams of biolite grains and broken quartz, the streams often parting and again meeting around the porphyritic "eyes." Occasional crystalline eyes of hornblende remain, but most of it has been converted into biotite. A point of especial interest is that the feldspar of the eyes is quite colourless and free from inclusions, like the sanidine of recent lavas, while, on the other hand, the feldspars of the inner and massive portions of the zone, out of which this outer portion has been reformed by pressure fluxion, are full of inclusions and have the "dusty" appearance so common in ancient feldspars. The fresh-looking feldspar eyes are therefore believed to have been subsequently formed as a result of a *recrystallisation* of the old material under the influence of *pressure fluxion*. In similar manner the biotite has been made out of the old hornblende, garnets have been developed, and the quartz has been granulated and optically distorted by pressure. The influence of pressure is also seen in certain Cambrian strata in the immediate vicinity, where a sandstone containing cylindrical casts of *scolithus linearis*, apparently identical with the "pipe-rock" of North-Western Scotland, has, like it, been compressed to such a degree that the vertical casts are flattened out and elongated in the direction of lamination

danger." "It may, however, play an important part in aggravating the consequences of a firedamp explosion." I had myself keenly felt how difficult it would be after a verdict of this kind, emanating from such high authorities, to make further progress in the work of convincing practical mining men of the truth of the views I had previously advocated in the pages of the Royal Society's *Proceedings*. For that reason, and in the absence of some powerful weapon wherewith to meet the French Commissioners with some chance of success, I have hitherto desisted from doing battle with them, although I have been satisfied they were in error from the first. The required weapon has been provided by Herr Hilt, the spokesman of the Prussian Commission, and may now, I think, be made use of without much fear of future contradiction.

Speaking of coal-dust from Pluto Mine, in Westphalia, Herr Hilt says, as the outcome of a long series of practical experiments on the largest scale yet attempted: "Es kann keinem Zweifel unterliegen dass man mit dieser Staubsorte bei Verlängerung der Strecke und Streuung auch der Flamme eine beliebige Länge würdegeben können. Ganz ähnlich erhält sich der Staub von Neu Iserlohn." Or: "There can be no doubt that with this kind of dust the flame could be lengthened out to any desired extent, provided the gallery and the layer of dust on its floor were made equally long." "The dust of Neu Iserlohn behaves in exactly the same way."¹

After carefully examining the details of this report, I think it not improbable that many, if not most, of the other twenty-four kinds of coal-dust that were subjected to experiment would have given results similar to those which led to the foregoing remarks had they been employed in the same state of minute subdivision. Differences in chemical composition do not appear to have as much effect in controlling the length of flame produced by a given dust under a certain set of conditions as the comparative fineness of the particles of which it is composed. In order to show the effect of fineness Herr Margraf has divided the dusts into five classes, as follows:—

Number of Dusts in each Class.	Designation of Class.	Length of Flame produced by firing 230 grm. of powder in cannon next floor, the floor being strewn with coal-dust for a length of 10 m.
Five, beginning with Pluto	Very fine	21 to 31 m.
Twelve, ending with Camphausen	Fine	13 to 21 m.
Four	Medium	12 to 15 m.
Five	Coarse	6 to 12 m.

Some experiments were also made with dust passed through sieves having meshes of various widths, which showed that the finer the state of subdivision, the longer was the corresponding flame.

From this it is obvious that before anything definite can be ascertained regarding the influence of chemical composition, it will be necessary to reduce the dusts to a uniform standard of fineness. Herr Margraf proposes to do this by passing them through a sieve with meshes 1 mm. wide. I am afraid, however, that some more exact method of effecting a separation of the very fine from the moderately fine particles will have to be resorted to before a satisfactory result can be looked for. A current of air ascending slowly at a uniform rate would be a better means than any conceivable kind of sieve.

I have on several previous occasions pointed out that when a colliery explosion has been begun in a dry mine the coarser particles of coal-dust are winnowed from the finer ones by the blast of air which sweeps through the workings in advance of the flame. It seems to me that

¹ It may be instructive to compare this conclusion with the second sentence of No. 1 paper, "On the Influence of Coal-dust in Colliery Explosions," *Proc. Roy. Soc.*, 1876; the second last sentence of No. 2 paper, *ibid.*, 1879; the conclusion of No. 3 paper, *ibid.*, 1881.—(Abstract).

under these circumstances experiments made with any other than the finest particles of each kind of dust can serve no practicable purpose whatever, and that any general conclusions drawn from them must necessarily be misleading. It is further highly probable that this is the rock upon which the French Commission was shipwrecked.

They had ascertained by actual experiment that, as the coarser particles of any given dust were removed by sifting, the flame produced under the same set of conditions became longer and larger in proportion to the fineness of the remaining dust. Yet they failed to carry the argument to its legitimate conclusion. They appear to have been misled either by too much speculation, or by the negative results of their experiments, due, it may be, to the smallness of the scale upon which they were made. They finally pronounced coal-dust to be an element of very secondary importance in colliery explosions, thereby allowing a splendid opportunity to slip from their grasp. The Prussian Commissioners were not slow to take advantage of the opening thus afforded them. Thanks partly to the large scale upon which they have set to work, partly to the natural fineness of Pluto and Neu Iserlohn dust, they have been fortunate in obtaining a series of positive results which amply confirm those previously obtained with the somewhat smaller apparatus belonging to the Lords of Committee of Council on Education set up in this country under the auspices of the Royal Society (No. IV. paper, "On the Influence of Coal-dust in Colliery Explosions," *Proc. Roy. Soc.*, 1881).

The dust brought from Camphausen Colliery does not appear to stand very high on Herr Margraf's list, and yet, since the publication of the memoir, that colliery has been devastated by one of the most violent explosions on record, in which it is admitted, I believe, that coal-dust, and not fire-damp, was the principal agent of destruction. Are we to conclude from this that the nine dusts which lie between Pluto and Camphausen in the order of relative danger are equally liable to produce a flame of indefinite length under like favourable conditions? and, if so, is it not obvious that the experiments are not as reliable as might be wished, since they fail to tell us so?

Before concluding, I might mention that Herr Hilt refers to and agrees with a remark made by MM. Mallard and Le Chatelier to the effect that the method of experiment followed by Sir Frederick Abel and myself when using the apparatus described in my first paper was "too little exact" to determine accurately what percentage of gas is required to render a mixture of coal-dust and air inflammable. My earliest experiments here referred to were made with the view of finding, if possible, some rational explanation of great colliery explosions which up to that time appear to have baffled every attempt to grapple with them, and were not intended to form a kind of counterpart on the large scale of the exact eudiometric processes resorted to in the laboratory. At the same time I may state, however, that, so far as I have been able to ascertain by reading and observation, the methods then employed will compare not unfavourably, as regards exactness, with any that have succeeded them, not excluding those of the Prussian Wetter-Commission.

W. GALLOWAY

THE FAUNA OF RUSSIAN CENTRAL ASIA

UNTIL within the last thirty years Turkistan has been unknown to science, and what is now ascertained concerning its fauna and flora is for the most part inaccessible to the scientific world because written in Russian. Not that apt writers of eminence upon the zoology of the country are numerous. They do not number a dozen, the names most conspicuous being Prjevalsky, Alpheraky, Bogdanoff, Severtsoff, and especially Fedchenko. Prjevalsky's routes do not touch mine, except in the Kulджа

Luis Vermees

decided red colour, the rest being white, as usual. Taking up some that fell in the gig, Mr. Mullan found that the colour was not merely superficial, but pervaded the substance of the hail-stone, and, on melting, they stained the fingers. He did not think, or had not the means, of preserving any of the water resulting. Has the like been observed before?

Spectral Images

MR. BIDWELL'S notice of spectral images (NATURE, vol. xxxii. p. 30) calls to mind certain phenomena I witnessed while riding in a railway train in Kentucky last October. The fence of the railway consisted of posts of about 6 inches in diameter, and twenty paces apart, connected by wires. The posts had newly been painted green. I was seated on the right side of the carriage, face forwards; the speed fully twenty miles an hour, with the sun behind my right shoulder, when looking at the posts on the left side, brightly illuminated by the sun, I observed that each post had the appearance of a twin post immediately in advance of it—touching it—of a red colour. To make myself sure that I was not deceived by some abnormal affection, I called the attention of a niece of mine to the phenomenon, and she saw it quite as well as I did. Another niece, however, failed to make it out. I am under the belief that the red post was the complementary colour of the green one, appearing the instant after the latter had been seen, and though apparently in advance in space of the green post, really was seen later in time. The fact of both being apparently seen simultaneously, is accounted for by the well-known law of retinal images lingering on vision.

HENRY MUIRHEAD

Cambuslang

THE NEW OUTBURST OF LAVA FROM VESUVIUS

YESTERDAY, May 2, up to two o'clock, Vesuvius appeared to be in its natural state of activity, such as persisted with slight variations for some considerable time. At that hour the lava, which was at some height within the cone of eruption, forced a way out at its base, traversing the plain of old lava filling the crater of 1872, and producing a rent about one quarter the way down the great Vesuvian cone. This rent represents the extension outwards of a volcanic dyke that has been in process of formation for over two years. A visitor during that period who walked around the southern rim of the 1872 crater, might have noticed a fissure varying from a few inches up to 2 feet wide, and extending inwards across the crater plain, until lost beneath the *ejectamenta* of the cone of eruption. From this fissure issued a powerful current of hot air, and in part of its course an abundance of HCl. This latter was indicated by the continual decomposition of the scoria and ash in its immediate neighbourhood, so that a large patch of yellow dust filled with the unattached pyroxene crystals was a point of bright colour in the black scoria-covered lava-plain. The lava at first actually issued, or, more properly, welled up from this fissure, but its point of exit was soon lowered by the cutting down of the outer slope. The lava soon commenced to flow down the cone with considerable rapidity, forming two distinct parallel streams averaging fifty metres apart, so that in the evening the landscape was lit up by these two brilliant streaks of fire. This morning I started early, and ascended on foot to the eastern side of the two streams, though often inconvenienced by the hot wind and exhalations blown off the lava. The streams take origin close together, and no doubt conjoin, but are covered by scoria—a vast quantity of *lapillo* and ash that has been slipped downwards and forward, forming a rough annular space which would require a drawing to explain. At the upper end of this we have part of the great cone slipped down, showing in section the dyke, which I may call hollow; we have a fissure which was filled by lava, and which consolidated and adhered to its sides, forming *salbam*; but before the central part solidified, the general level was lowered, and

it drained away, leaving the dyke divided in two by an empty space. At 2 p.m. to-day the streams of lava had the following dimensions at their exit:—

	Eastern		Western
Breadth about	1½ metres	...	About 2½ metres
Depth estimated at 1 metre	at 2 metres
Rate of flow on both, about 1 metre per second.			

The output therefore equals for the eastern stream about 90 cubic metres per hour, or 2160 cubic metres in 24 hours, whilst that of the western stream represents 300 cubic metres per hour, or 7200 in 24 hours. The two streams, therefore, represent an output of 9360 cubic metres during the 24 hours, from May 2 to 3, at 2 p.m. This quantity would equal a deposit of rock of about 1 km. long, 9 m. broad, and 1 m. thick, which is rather an under-estimation of what now lies on the side of the mountain, for the two streams had at the hour of observation traversed more than two-thirds of the *pedimenture*. The amount of lava represents far more than what occupied the chimney above the level of the lateral opening, and the mechanism of the increased quantity extruded I have gone into fully in a paper read last week before the Geological Society. The cone of eruption only now gives forth vapour, its stone-throwing propensities being stopped by the lowering of the magma level. In consequence of the want of support of its inner walls by disappearance of the fluid column, these are rapidly crumbling in, and the craterial inner cavity much increased in size. In the same way a breach has been made in the line of the dyke by falling in of that part of loose materials immediately above it.

This change in Vesuvius will no doubt be put down in history as an eruption, and possibly a relationship sought between contemporaneous earthquakes, or some other phenomena. It is nothing more nor less than the final giving way of part of the cone before a dyke that has been working its way out for years.

I send you these few notes after a long day's climb, exposed to great changes of temperature and mephitic vapours. I ask, therefore, that this will be taken as an excuse for these rough and ready notes, which I thought your readers would be interested to have quickly.

Naples, May 3

H. J. JOHNSTON-LAVIS

EXPERIMENTS WITH COAL-DUST AT NEUNKIRCHEN, IN GERMANY

IN a former article on this subject which appeared in NATURE of Nov. 6 last (p. 12), I described the apparatus employed by the Prussian Firedamp Commission in making their experiments, and at the same time I gave an account of four experiments that were seen by Mr. Wm. Thomas Lewis and myself.

No official account of these experiments had been published at that time, but quite recently Herr Hilt and Herr Margraf have made a joint report in the name of the Commission. As this report is intended to be only a preliminary one, it does not give the whole of the details of each experiment, but it shows as far as it goes that everything has been conceived and carried out in a spirit of liberality and thoroughness.

At the outset Herr Hilt states that the uncertainty which seemed to surround this important question, and in particular the peculiar views that had been enunciated by MM. Mallard and Le Chatelier, who reported upon it to the French Commission du Grisou,¹ had induced him to address a letter on the subject, dated December 15, 1883, to the Prussian Wetter-Commission, urging them as a matter of duty to take it up and investigate it by a series of large-scale experiments. The French Commissioners, referred to, stated at the end of their report that "they considered it established that coal-dust in the absence of fire-damp does not constitute an element of

¹ *Annales des Mines*, Janvier—Février, 1882.

THURSDAY, APRIL 22, 1886

INJURIOUS INSECTS

Reports on Insects Injurious to Hop Plants, Corn Crops, and Fruit Crops in Great Britain. Prepared for the Agricultural Department, Privy Council Office, by Charles Whitehead, F.L.S., F.G.S. No. II., "Insects Injurious to Corn, Grass, Pea, Bean, and Clover Crops." (1885.)

Reports of Observations of Injurious Insects and Common Farm Pests during the Year 1885, with Methods of Prevention and Remedy. By Eleanor A. Ormerod, F.R. Met. Soc., &c. (London: Simpkin, Marshall, and Co., 1886.)

THE first of these works, a Government Report issuing from the press of Messrs. Eyre and Spottiswoode, and bearing the announcement that it was "Presented to both Houses of Parliament by command of Her Majesty," forms the second of the series, and is a very valuable contribution to the knowledge of the insects destructive to crops mentioned above. It will be of great service to agriculturists, whether scientific or otherwise, as the whole Report from beginning to end is written in a clear and concise manner, without losing any of its accuracy. The Report occupies seventy pages, and of these, forty-nine pages are devoted to "Insects injurious to corn and grass crops." From p. 50 to 56 "Insects injurious to corn in store" are treated of, and from p. 57 to the end "Insects injurious to pea, bean, and clover crops" are dealt with. Each insect has a separate article devoted to it, uniformly treating first of the habits of the creature, the manner and extent of its devastations, then under separate heads the life-history is given, prevention, and remedies.

The crane-fly, or more popularly the daddy-long-legs (*Tipula oleracea*, L.), comes in for a considerable share of attention. Mr. Whitehead reminds us that "It is the larvæ or grubs that injure plants of corn and grass, by attacking them with their strong jaws and eating into them just beneath the surface of the ground, so as either to kill them or make them weak and sickly. In the early spring, if wheat plants which show signs of failing are examined, large ash-grey grubs or maggots will often be found close to the affected plants. Oats and barley are equally liable to harm from these grubs, not perhaps quite to such an extent as autumn-sown wheat, and especially wheat sown after clover leys."

Mr. Whitehead gives the following estimate of loss occasioned by these insects:—"A field of oats sown on March 1, after clover, was attacked by these grubs. Although it was an even strong plant, it was soon nearly half devoured, and, instead of nine quarters per acre being obtained, as might have been expected from the state of the land, and the circumstances of its cultivation, and the produce of other land hard by, only about four quarters per acre were grown. It is computed that the loss in this case amounted to 80*l.*" As an illustration of Mr. Whitehead's manner of treating the life-history of the several insects, the following quotation from that of the daddy-long-legs will suffice:—"The life-history of the crane-flies, both of the *Tipula oleracea* and its close congener

Tipula maculosa, is simple. The eggs are small, oval, conical grains, shining and black as ebony (as Curtis writes), forming a mass which occupies nearly the whole of the abdomen. As many as 300 have been found in one female. These are deposited, in the autumn, upon grass and herbage, and more frequently in the ground. Wet, undrained meadows and marshy and damp places are preferred by these insects, and the conditions of such spots are probably favourable to the preservation and the ultimate hatching of the eggs. This hatching takes place in the early spring, directly the weather becomes mild. . . . After hatching, the maggots or larvæ grow fast until they become an inch in length. Labourers call them 'leather jackets' because of their tough skins. Their colour is of the earth, with a slight dash of grey or ash colour in it. Although they have no legs, they are able to move rapidly from place to place, and burrow in the ground. It is in this grub form that they do mischief to crops, and they remain in this stage of their existence until the beginning of July, at which period they change into pupæ under the surface of the soil. After a while the pupæ work their way up to the light by means of hooks or recurved spines, and in a short time the crane-flies appear, and soon unfold their long wings and fly away to commence a new series."

After some further notes descriptive of the insects, some instructions are given under the heads of Prevention and Remedies.

It will be seen that the mode of imparting information is of the simplest and clearest description, and in this as well as in the manner of treatment the author has followed Miss Ormerod in her well-known manual, and moreover he frequently quotes her views and opinions expressed throughout her valued reports.

Just as we are finishing this notice Miss Ormerod's ninth annual "Report of Observations of Injurious Insects and Common Farm Pests during the Year 1885, with Methods of Prevention and Remedy," comes to hand. Like its predecessors, it is full of interesting and valuable records. Miss Ormerod has still something more to say on that general pest referred to above—the daddy-long-legs. It is, perhaps, not generally known how difficult the grubs are to kill, but Miss Ormerod's experiments, as recorded in a previous Report, proved that they could endure almost any amount of freezing and yet come to life as the season returned. Speaking of the grubs, one correspondent, in the Report before us, says:—"In my experience, any chemicals applied for their destruction when they begin to make their ravages must destroy the grain. I have had them covered with salt and soot over night, and they have been alive in the morning." Miss Ormerod here notes that "This observation quite agrees with the result of the experiments of Mr. Ralph Lowe (noted p. 26 of Report for 1884), in which grubs covered respectively with quicklime, soot, household salt, and superphosphate, and also some placed in earth mixed with one-fourth of white arsenic, were not at all the worse, excepting those that had been in the arsenic, and even these recovered before the following day. But nitrate of soda had much more serviceable effects."

It is satisfactory to find that the cases of injurious insects which were exhibited for so long a time in the Bethnal Green Museum are being thoroughly overhauled.

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Charles H. Ormerod
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Miss Ormerod remarks in the preface to her Report that the rearrangement of these cases, in which are shown insects injurious to crops, fruit, and timber, is now in progress, and promises to be of practical service. "The insects exhibited are for the most part those which are serious in their ravages, and, as far as is possible, they are shown in their various stages (either by specimens, drawings, or models), with samples of injury caused by them accompanying."

Appended to the Report are some special observations on the warble-fly or ox-bot-fly.

ACROSS THE JORDAN

Across the Jordan: Being an Exploration and Survey of Part of Hauran and Jaulan. By Gottlieb Schumacher, C.E. With Additions by Laurence Oliphant and Guy Le Strange. (London: R. Bentley and Son, 1886.)

THIS volume is the last of several recently published by the Committee of the Palestine Exploration Fund, following quickly on the steps of Conder's "Heth and Moab" and Hull's "Mount Seir," and describes with great accuracy a district lying to the east of the Sea of Galilee not often visited; or, if visited, only hastily skirted, by travellers on the road from Jerusalem to Damascus. How little is known of its geographical details may be gathered from a comparison of the excellent map which faces the title-page of the book with any of the best maps now published. The district described embraces the eastern part of the Jaulan and the western of the Hauran, and is remarkable for the number and variety of its works of ancient art, dating from the time of the dolmen-builders to those of the Crusaders, and including structures referable to Jewish, Greek, Roman, and Christian times. How this region came to be explored is narrated by Mr. Walter Besant in the preface. It appears that about a year ago a firman was granted by the Porte for the survey of the district lying between Haifa on the Mediterranean and Damascus, with a view to the construction of a railway. For the western part of this route, namely, that between Haifa and the Jordan Valley, the maps of the Palestine Exploration Society afforded the necessary details; but from the Jordan to Damascus the line of country had to be specially surveyed, and this work was intrusted by the *concessionnaires* to Herr Gottlieb Schumacher. In the course of his work Herr Schumacher was able to make many scientific observations, as well as maps and drawings of villages, structures, and works of art, which he afterwards embodied in the memoir forming the greater part of the present volume. A ready means of publication was found in the active Society which has done so much in elucidating, and embodying in maps and memoirs, the topographical details of Palestine and its borders.

To the geologist, as well as to the antiquarian, the region of the Jaulan and Hauran is full of interest, and the author has added some details on its geological structure which are very acceptable. The best and most recent observations on this subject are those of Prof. L. Lartet, and contained in his work on the geology of the Dead Sea.¹ The country, as is well known, is volcanic,

¹ "Voyage d'Exploration à la Mer Morte," par M. le Duc de Luynes; tome 3me, "Géologie" (Paris).

and is largely covered by sheets of basalt, scoriæ, and ashes which have been erupted from numerous vents, some of which lie in the district here described. Several of these, such as Tell-*ej-Jabiyeh* and Tell-*ej-Jemû'ah*, reach an elevation of considerably over 2000 feet above the Mediterranean, and therefore of nearly 3000 feet above the surface of the Sea of Galilee. The southern margin of the Jaulan region, as well as of the basaltic formation, is marked by the deep gorge of the Yarmûk (Hieromax of Pliny), to the south of which the soft *Cretaceo-Nummulitic* limestones reach the surface and afford a genial soil to forests of oak. The Yarmûk receives several tributaries from the north, now correctly mapped for the first time, which lay open on their banks fine sections both of the volcanic rocks and of the underlying chalky limestones; and these streams, which are large and swift, are often precipitated over cliffs of basalt, forming fine cascades. One of these in the Wady Seisûn, a tributary of the Rukkad, has a fall of 100 feet, and then, pursuing its course by a succession of cataracts, unites with the larger stream after falling 517 feet in 420 yards. The Rukkad rises at the foot of Mount Hermon (Jebel-*esh-Sheikh*), a little above the village of 'Ain-el-Berbab, and, upon the melting of the snows in early summer, sends a large flood of water into the Yarmûk. It is remarkable, however, that none of these streams depend altogether on surface drainage for their permanent supplies, as they have their sources in springs; and the combined volume of these waters goes to form a river of equal volume with that of the Jordan itself where it leaves the Lake of Galilee. There are clear indications of the existence of large underground reservoirs of water in the basaltic and calcareous formations. The winter snows and "the former and latter rains" of autumn and spring rapidly sink into the fissured and broken strata, and are pent up, either in the mass of the rock itself, or in caverns which have been formed in the limestone by the solvent action of percolating water. These waters probably accumulate under the tracts sloping towards the south from the base of Hermon to the north of the Yarmûk Valley, and when a vent is formed rise to the surface with force. One of these springs, that of Râs-el-'Ain at the village of El Mezeirîh, fills a considerable basin, and is two to three yards across and about two feet deep at its source; others are of nearly equal copiousness and more or less thermal.

The physical phenomena connected with the district described by Herr Schumacher have their counterpart in the volcanic district of Central France, with this exception, that there do not appear to be any examples of the highly silicated class of lavas, such as domite, trachyte, &c., which we generally find associated with the basic varieties. As regards the geological age of the volcanic outbursts, the question is brought within narrow limits by their relations to the Cretaceo-Eocene limestones. Both these formations appear to have been not only deposited, but subsequently upraised and largely denuded, before the volcanic lavas issued forth from their subterranean reservoirs. As this movement and denudation of the strata took place in the Miocene epoch, the volcanic eruptions may be referred, with little uncertainty, in the main to the succeeding Pliocene; an epoch remarkable for outbreaks of vulcanicity over large portions of the globe. At

the same time it is not improbable that the first outbursts may be dated back to the later Eocene, and the last to the period when the waters of the great Jordan-Valley Lake had receded from their original limits to those within which they are now restricted.

The physical details form but a small part of the volume, which contains a large number of carefully drawn figures of works of art and architecture, accompanied by descriptive text, showing that the region, now the abode of Fellahin—or of migratory Arabs—was one of importance during long centuries of successive dynasties and races. The book cannot fail to be of value to students of Biblical and ancient history, and we are promised by Herr Schumacher descriptive drawings and maps of another section of the Hauran country.

HARBOURS

The Design and Construction of Harbours. A Treatise on Maritime Engineering. By Thomas Stevenson,

(1699); also of 10 cross-sections of lighthouses, beginning with Winstanley's Eddystone (1699).

A chapter (47 pp.) is devoted to materials. A good deal is said about their decay under water. No ordinary material seems free from this. All timber is eventually destroyed by borers (oddly termed *insects* in this work!) of different sorts; even greenheart and creosoted timber, till recently thought borer-proof, have now given way to their special borers. Most stone, and even rock *in situ*, has its own special borer. Iron gives way by rusting, perhaps at a rate of three-quarters of an inch in a century. Bronze alone seems to stand sea-water, but is too expensive to be extensively used.

Ten pages are given to the use of Portland cement concrete, and some remarkable instances of its use are detailed, *e.g.* the concrete cylinder foundations (12 feet diameter, 30 feet length) of the Plantation Quay at Glasgow, and the use of 350-ton blocks (say 5000 cubic feet) laid in 24 feet of water at Dublin (1885).

Attention is drawn to a new

Space might have been saved by the exclusion of special subjects, *e.g.* lighthouse apparatus, &c., which could not be treated at adequate length.

A short glossary of uncommon terms would have been decidedly useful, *e.g.* alveus, bollard, kant, pawl, scend, staith.

These blemishes are, however, small compared with the great merit of the work as a whole, which deals with the difficult and important subject of harbours in a thoroughly masterly manner.

ALLAN CUNNINGHAM, (Major, R.E.)

OUR BOOK SHELF

A First Course of Physical Laboratory Practice. By A. M. Worthington, M.A., late Assistant Master at Clifton College. (London: Rivingtons, 1886.)

PROBABLY no one has so successfully carried on practical science teaching in schools as the author whose excellent work at Clifton College has done so much to gain for that school an enviable reputation. He therefore is

tage be modified as being not strictly correct, though any false impression which it would produce might be removed by the more exact statements five pages later. Having shown that the bending of a lath depends on its length, the author proceeds to show that thickness affects the bending. He says:—"Now take a lath of double the thickness, or, what is the same thing, lay on the first lath a second similar one, and put on the same weight, . . ." This would be a serious blunder to make if the effect of depth were not well shown later. As the fact that the stiffness of a beam is directly proportional to its width is explained by considering it as equivalent to beams side by side, the opportunity is lost, when the effect of depth is considered, of showing that a beam is *not* equivalent to beams lying above one another, and why.

As a text-book for school use, Worthington's "First Course of Physical Laboratory Practice" is highly to be recommended.

Lectures on Heat, Sound, and Light. By Richard Wormell, D.Sc., M.A., Head Master of the City of London Middle-Class Schools. (London: Thomas Murby.)