instructive as it is interesting to all who take the opportunity of glancing at it. There is a routine about educational works which is rarely diverged from to any considerable extent. Beyond the information they contain there is always a mass of oral tradition, glimpses into which only occasionally appear in print. This becomes, in many cases, the basis of the higher work of the succeeding generation, and to the student it is an invaluable adjunct to his more formal reading. In the small book before us, Prof. Newton has touched upon some of these less familiar points, bringing to the foreground several questions, the importance of which in the general economy of nature is scarcely sufficiently appreciated. He commences by a most instructive analogy, comparing the different members of the animal kingdom to a mixed collection of coins in a bag, whose history is to be determined mostly from what is to be found on their surfaces. Some, like fossil forms, are no longer current; in other words, they are extinct. Others, in their stamping give indications of the histories of the nations by which they were struck, as do organised forms by their external shape and internal structure; and so on. Upon this basis the principles of classification are, on an evolutionary foundation, established in a most lucid manner. An anecdote, particularly to the point, shows the fallacious reasoning into which students are likely to fall when they lay too little stress on the accuracy of the most minute facts, the mistake of a distinguished French naturalist with regard to the habits of the swallows found at Rouen being the instance given. The section on Geographical Distribution, when read in connection with the small map which is introduced, is as definite and precise as can be desired; at the same time that the observations on the effects of peculiarities in the physical conditions of life on the organisation of species have a bearing the full significance of which Prof. Newton has done so much to indicate. The remarks on nomenclature will also be fully assented to by all working naturalists. One of the chapters is devoted to a rapid sketch of the different classes of the animal kingdom; and this, when taken in connection with those on the subjects above mentioned, makes the little volume as complete an introduction as can be desired to the science of which it treats.

LETTERS TO THE EDITOR

[The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts. No notice is taken of anonymous communications.]

Marine Boulder Clay, and other Deposits

IT seems from the concluding paragraphs of the report of the *Challenger* Observations in NATURE, vol. xi. p. 116, that the dredge has at length settled the question of the mode of deposition of marine boulder clay, and shown that in the Southern Ocean it is now being formed over areas perhaps as great as those now covered with similar deposits in the northern hemisphere. The facts stated show (1) The deposition of a bed of mud and sand with fragments of stones from floating ice; (2) That this deposit is so rapid as completely to mask or supersede the ordinary deposition of organic slime; and (3) That in certain areas of deep water there is a possibility that an excess of carbonic acid may remove all trace of calcareous organisms. It is further to be observed that, owing to the small amount of land, the conditions are probably much less favourable than those which existed in the north at the time of the great Post-pliocene subsidence.

These facts appear to me to confirm the conclusion which I have so often stated with reference to the boulder clay or "till" of North America, and which I have endeavoured to establish by the nature of the deposits now taking place in the areas of ice-drift on the coast of North America, by the distribution and chemical characters of the boulder-clay itself, and by the occurrence of marine fossils in it. It is to be hoped that in future we shall not have so confident assertion as heretofore, that these

remarkable clays are due to the action of land ice, and that they will cease to be regarded as affording evidence of a "continental ice-cap" in temperate latitudes.

The details given in the same communication with reference to the formation of a "red clay" from the decomposition of organic ooze, in connection with the remarks of Prof. Williamson in NATURE, vol. xi. p. 148, are also very suggestive. They help to account not merely for certain red clays and slates and beds of silicious organisms, but also for the association of glauconite and other hydrous silicates with organic marine beds of all ages; an association which I have long held to be not accidental, though its precise chemical conditions may be obscure. The time may not be distant when geologists may learn to regard many deposits of this kind, from the Serpentine, Loganite, and similar minerals of the Laurentian up to the Modern Greensands, as products connected with the animal life of the sea, or dependent on it for their accumulation. Some chemical suggestions bearing on this will be found in Dr. Sterry Hunt's recent volume of "Chemical and Geological Essays," which I would commend to the study of all your younger geologists.

McGill College, Jan. 20

J. W. DAWSON

The Transit of Venus

AMONG the brief telegraphic accounts given in NATURE, vol. xi. p. 122, of the work done by the several Transit expeditions, is one from Janssen, in which it is stated that Venus was seen over the sun's corona before contact (which contact, external or internal, is unfortunately not mentioned).

The idea of the rim of light round the planet being due to the corona does not seem to have struck other observers; and there are one or two points, gathered from my own observations, for and against the conclusion, that I may perhaps be pardoned for bringing forward.

For the coronal view, then. I looked for, but failed to see, the retreating edge of the planet after last external contact. The air, however, was less steady than in the morning, and my eye was very weary with straining at the last tiny indentation made by Venus on the sun's limb.

Against the theory there are the facts that the line of light was apparently of equal thickness throughout, and at half immersion was visible up to the sun's limb without perceptible loss of light; that at first internal contact, or rather when the cusps had almost united and the solar light was but little cut off (*vide* A in diagram), the last portion of the ring was undiminished in brightness. Finally, in the pencil notes taken at the time, I find, referring to the ring of light, these words: "A brighter spot on lower limb, entering sun about $\frac{3}{4}$ immersion" (*vide* B). This spot I then imagined to be due to a portion of the planetary atmosphere, freer from cloud, and therefore refracting more light than the rest.

Taking Janssen's view, it may be accounted for by presuming the planet to have travelled over a bright streak of corona, or possibly an elongated prominence.

It will be interesting to know whether coronal structure was seen by any of the observers.

E. W. PRINGLE

Manantoddi, Wynaad, Jan. 15

Ants and Bees

IN his recent paper on "Ants and Bees," Sir John Lubbock is reported to have said—alluding to the bees which had tasted the honey he had set for them:—

"If bees had the means of communicating knowledge, no doubt these bees would have told the others in the hive where

they could obtain a good store of honey with very little trouble, and would have brought a lot back with them."

Later on he says that he has come to the conclusion that what sometimes "appeared like affection was invariably dictated by selfishness."

Now, is the example given by Sir John of the want of communicative power afforded by the bee sufficient, or, indeed, any evidence of the fact? Is it not rather an excellent instance of the intense selfishness which governs the bee, in common with all other creatures, in its aim to prolong the life of the individual without a care for that of its fellows?

Again, Sir John says:—

"It was not altogether a selfish feeling which induced bees to show such eagerness to gather honey, for what they took to the hive was for the good of the whole colony."

This act seems to me to be in no way inconsistent with absolutely selfish motives. Bees find that there is strength in union, and that the winter months, which would kill them if left alone, they can survive by adopting principles of co-operation. The stronger the individual bee the more likely is she to derive benefit from the partnership, and a hive may, in fact, be regarded as a "tontine" association.

Lastly, when Sir John Lubbock says—"With regard to swarming bees by beating the warming pans, he thought there was nothing in it, but that it was an idea which had got possession of some people in the same way as many savage tribes believed that by making hideous noises during the eclipse of the moon they could frighten away the evil spirit which held her"—he would appear to have overlooked the fact that this is a practice arising from the peculiar ownership, of which, under English law, bees are the subject.

"Bees are *fera natura*, but when hived and reclaimed a man may have a qualified property in them, by the law of nature as well as by the civil law" (Puff. c. iv. c. b. s. 5., Inst. II, l. 14.) "Though a swarm," says Blackstone, "lights upon my tree, I have no more property in them till I have hived them than I have in the birds which make their nests thereon, and therefore, if another hives them he shall be the proprietor; but a swarm which flies from and out of my hive are mine so long as I can keep them in sight and have power to pursue them, and in these circumstances no one else is entitled to take them."

Hence the origin amongst villagers of pursuing a swarm with the clamour of pans and fire-irons; not for the benefit of the bee, *quæ* bee, but in order to inform others that the followers are the possessors of the swarm.

It is easy to imagine that now some villagers may (confounding cause and effect) assert that the sound assists the operations of the bees or those of their hiver.

ALFRED GEORGE RENSHAW

Doctors' Commons, London

On the Value of the so-called Chameleon Barometer as an Hygrometer

A PIECE of filter paper soaked in a strong solution of cobaltous chloride (CoCl_2) is blue when dry, and red when moist; and I have found it very sensitive to slight changes in the quantity of moisture in the atmosphere, being more delicate than the thermometers I used.

The paper was suspended in a room, on the wall facing a south window, which was kept open during the day. By the side of the paper was hung a wet and dry bulb thermometer, reading to 2° Fahr., and observations were recorded three or four times a day for nearly a year.

I adjoin a few of the readings taken, as from their regularity it is unnecessary to give them all. The scale of change of colour was reckoned from 0 to 10, from red to blue.

It will be observed that for a difference of 13° between the two thermometers, the paper is quite blue, and it becomes red at a difference of from 1° to 3° . There is, of course, a limit to the change of colour, as when blue it cannot be any more blue, although the air should lose moisture. However, on the hottest day last summer it stood at 10, or maximum blue, for a difference of 13° between the thermometers, and when this difference fell to 12° the paper showed a decided change in tint.

It appears that the actual temperature has nothing to do with the colour of the paper, as it registers the same tint for the same difference between the two thermometers (with very slight variations) whether the day be hot or cold.

I think that such a paper is a handy addition to the thermo-

meters, as you can see at a glance whether the air is wet or dry.

DATE.	Dry-bulb Thermometer.	Wet-bulb Thermometer.	Difference.	Colour of Paper, 0—10.	REMARKS.
July 8, 1874.					
1.30 P.M.	72	60	12	9	Very hot day.
5.30 "	74	61	13	10	
12.30 "	70	59	11	8.5	
July 10.					
9.30 A.M.	74.5	65	9.5	8	Much hotter than the 8th, and yet paper not so blue.
1.30 P.M.	77	67	10	7	
5.30 "	79	67	12	9	
Sept. 30.					
1.30 P.M.	62	56	6	3	Barometer falling for rain.
8.0 "	64	61	3	1	
Oct. 1.					
9.30 A.M.	62	58	4	0.5	Rained in night. Barometer rising.
10.30 P.M.	63	59	4	1	
Oct. 2.					
1.30 P.M.	59	55	4	0.5	Bar. fallen, showery. Bar. steady, cleared up. These two days show the paper to be more sensitive than the thermometers.
6.40 "	58	53	5	1	
Oct. 23.					
1.30 P.M.	52	48	4	1	Wind N.
6.30 "	55	54	1	0	Wind W.
Dec. 3.					
10 A.M.	43	40	3	2	Sharp frost.

Rugby, Jan. 16

A. PERCY SMITH

Phosphorus and Carbon Disulphide

KNOWING the highly refractive power of phosphorus, and also of carbon disulphide, it occurred to me that a solution of the former in the latter might yield a liquid more highly refractive than any I had yet met with.

I could not succeed in making a solution so saturated that when another piece of phosphorus was put in it should not be affected. I made, however, an exceedingly concentrated solution. This solution had to be filtered. The clear liquid had the property of continually precipitating phosphorus, in what I believe was the red form. The solubility of phosphorus in carbon disulphide is very remarkable. Has it a definable limit? or is phosphorus, at ordinary temperatures, really a very viscous fluid?

Also I made a perfectly saturated solution of sulphur in carbon disulphide. This was much more easily accomplished, and it showed no tendency to change from its condition of a clear light-yellow coloured fluid.

A hollow glass prism, angle 60° was used, and kept in position of minimum deviation for sodium light for each substance.

Values of Refractive Indices are given in the following table:—

Refractive Indices.

	Lithium a.	Hydrogen C.	Sodium D.	Hydrogen F.	Hydrogen G.
P in CS_2 at $51\frac{1}{2}^\circ \text{F.}$ }	1.7648	1.7749	1.7780	1.8136	—
S in CS_2 at $51\frac{1}{2}^\circ \text{F.}$ }	—	1.6840	1.6890	1.7254	—
CS_2 alone at 55°F. }	—	—	1.6321	—	—
Flint glass at $51\frac{1}{2}^\circ \text{F.}$ }	—	1.6193	1.6244	1.6370	1.6470

The hydrogen lines were obtained by a Geissler tube.

I do not give the measurements as more than near approximations, as I had no time to repeat them. They were made in the Cavendish Laboratory at Cambridge.

Harrogate, Jan. 21

CHAS. T. WHITMELL

The Micrographical Dictionary—Pollen Grains

It is a pity that Mr. W. G. Smith (NATURE, vol. xi. p. 286) did not take the trouble to satisfy himself of the truth of Dr. Hugo