connected with the periodic variation, will presently appear in the Scottish Reports of the North Sea Investigation Committee. D'ARCY W. THOMPSON.

University College, Dundee, December 9.

Reform of Zoological Nomenclature.

THE labours of the committee proposed by Mr. Boulenger at the British Association for remedying the abuses of zoological nomenclature will be enormous, even if restricted to the settlement of common generic names. To hope that they should extend to large numbers of species, or to species of the less prominent groups, is, I fear, impossible unless a more wholesale method of dealing with the names be adopted.

The necessity for extending the settlement to a large number of species of such groups as the Polychæta is very pressing, since hundreds of names were given by the earlier workers, whose limited knowledge of the group made their giving a moderately adequate description of the species named an impossibility or apparent superfluity. Without some such arrangement as that proposed below the nomenclature of this and other similarly placed groups will remain in a state of flux for years beyond our generation, and in consequence the labours of the conscientious worker will be not so much to the advancement of knowledge as to the weighing of all sorts of circumstantial and fragments of documentary evidence to determine what some culpably incomplete description really refers to. As a case in point see the list of synonyms for *Aphrodite aculeata* in McIntosh's "Monograph of the British Annelids," and consider the patient and learned labour spent on that compilation which might have been employed in direct scientific investigation. Then compare a case where the species dealt with is not a rather isolated and very well-marked form, but one having several related species living in its vicinity, none of which have any very striking characteristic! The labour in such a case is endless, the conclusion arrived at being always liable to be upset by some purely circumstantial evidence accidentally coming to light.

So far as I can see, the only way in which species names can be dealt with wholesale, and several thousand names be given priority, once and for all, is for the committee to confine themselves to the consideration of books rather than to individual names. I should suggest that experts in the systematic literature of each group prepare short lists of the most important descriptive works. Care would be taken to include only such works as contain a good number of definitions of genera and descriptions of species, and that the descriptions should be adequate and well illustrated. The number of works in each group would not be large, but the number of species contained would be much greater than could possibly be dealt with by any committee attempting to determine the extent of usage of each name separately. The names given to species *described*, whether as new or not in this selection of works, would be made unalterable. In case of synonymy within the list, the rule of priority would apply.

To give an example, again, from the Polychæta. I should suggest the following works to be among those the nomenclature of which should be inviolable:—

(1) Claparède, "Annelides Polychètes du Golfe de Naples" (but possibly not his other work on Polychæta from near the Spanish frontier).

(2) Ehlers, "Die Borstenwurmer," and several recent works on South American collections.

(3) McIntosh, "*Challenger* Reports," vol. xii. The *Challenger* reports would all be reckoned authoritative, I suppose, thus securing an immense number of settled names at once.

(4) McIntosh, "Monograph of the British Annelids."

Some famous works, *e.g.* Kinberg's and Grabe's, even the latter's "Annulata Semperiana" I personally should not include, and some voluminous recent literature certainly should be omitted. I do not mean that such works should be allowed to lose any of the usefulness they have at present, but should be searched rather for their facts than their namings.

My plan will certainly cause some unjust neglect of some few well-made descriptions of species, but can any beneficent and effective legislation, on any subject whatever, be framed to avoid all injustice to small minorities? In comparison with the injustice which gives any easy-going name-giver authority to mar the work of the laborious describer, this is nothing.

It has the advantage of substituting the authority of series of the best works for that of the committee. Cavillers may object to the most authoritative committee of living and possibly interested men, but are less able to object to this reinforcement of the authority of the most eminent workers in each group, many of whom are now beyond all personal interest in the preservation or neglect of their particular systems of nomenclature.

My plan is doubtless full of difficulties, but I believe not more so than any other proposed, while the remedy goes deeper, not, as in other cases, merely touching the surface of this great hindrance to progress and order.

CYRIL CROSSLAND.

Port Sudan, Red Sea, November 13.

Mercury Bubbles and the Formation of Oxide Films by Water containing Oxygen in Solution.

THE formation of mercury air bubbles described by Mr. Wright, Sir William Crookes, Mr. Hare, and Prof. Dixon seems to be a different phenomenon from that described by the late Prof. P. G. Tait in his "Properties of Matter" (1899, p. 257) in the following passage:—

"Even so dense a liquid as mercury can be formed into a bubble. We have merely to shake a glass bottle *filled* with water and clean mercury. The bubbles which form on the mercury (often detached) are full of water. Sometimes we see others coming up from the interior of the mercury. These are water-skins full of mercury."

I have repeated Tait's experiment, using a 250 c.c. bottle containing about 50 c.c. of mercury and filled quite full of water. A short, vigorous shaking fills the bottle with a foam of mercury bubbles, which quickly subsides, leaving some isolated bubbles, which also quickly sink to the bottom and disappear in the mass of mercury. The bubbles formed in this way are therefore mercury *water* bubbles, not mercury *air* bubbles. The addition of sulphuric acid to the water stops the formation of bubbles; the shaking then breaks up the mercury into minute solid globules.

During the experiment an observation was made which, while it does not bear directly on the formation of mercury bubbles, is perhaps of some interest. It was found, when water which had not been freed from dissolved gases was used, that the liquid set free by the bursting of the bubbles had a smoke-brown colour by transmitted light. As the foam subsides into the mercury below this brown cloud is left floating over the surface of the mercury. The cloud left by the bursting of single bubbles can sometimes be observed floating in the upper part of the liquid. With water that has been freed from dissolved gases by boiling this appearance does not occur.

The browned water, after standing for a few minutes, was decanted into a clean vessel, and was watched for about an hour. During this time no deposit settled from the liquid. A drop of the liquid was then examined under the microscope with illumination by an intense oblique beam of reflected light, and also by transmitted light with a high-power objective. Two kinds of particles were present, minute globules of mercury measuring from 2000 to 6000 $\mu\mu$, and shreds and spicules of oxide film. The latter, which are only visible under the oblique beam, are in constant pedetic movement. They are not spherical aggregates, but minute plates, which appear and disappear as they turn and twist in the unidirectional beam of light. The oxide film which forms on the stretched mercury surfaces has, no doubt, the same microstructure as I have found alike in solid and in liquid films—a kind of lenticular granulation due to surface tension. The sudden collapse of the mercury film sheds the oxide film, and causes it to break up into minute lens-like plates or spicules, which are in pedetic movement. In some cases these plates form aggregates of considerable size round the minute mercury globules. These aggregates are sufficiently massive to be visible by transmitted light. G. T. BEILBY.

Glasgow, December 12.