

I am also quite willing to admit that there may be other causes tending to raise the zero-point besides the equalization of tension, such, for instance, as the chemical changes alluded to by Prof. Mills; but I should like to ask, as I am ignorant on the point, whether there is any experimental evidence of their nature or existence.

SYDNEY YOUNG.

University College, Bristol, January 11.

#### Foreign Substances attached to Crabs.

IN your issue of December 26, and also in exhibiting his collection of crabs before the Linnean Society, Mr. Pascoe cast some doubt on the function of the two pairs of modified legs of *Dromia vulgaris*, which are usually supposed to be adapted to the retention of the sponge with which it covers its carapace.

That these legs were really used for this purpose I was enabled to observe, during my stay at the zoological station in Naples last winter. I had in my tank several specimens, in some of which the sponge had also extended on to the ventral surface, over the edge of the carapace, thus securing a firm hold apart from the action of the legs. In all specimens, however, there are seen, when the sponge is removed, which requires considerable force, two oblique depressions into which the legs fit, giving them thus a distinct hold on the sponge.

If the latter be, however, removed from the animal but left in the tank, the crab soon sets to work to regain possession of its covering, and can be seen to use its modified hinder pairs of legs most effectually for this purpose. It would seem therefore beyond doubt that these modified legs serve not only for holding on the sponge, but also for getting hold of a new sponge, should the old one get injured or die, as must happen not infrequently.

F. ERNEST WEISS.

The Zoological Laboratory, University College, January 6.

#### Galls.

I AM sorry if I unintentionally misrepresented the opinions of Prof. Romanes and Dr. St. George Mivart in suggesting that they wished to assail the theory of natural selection in their recent communications to NATURE on this subject. They must, however, pardon me for saying that I still think the extract to which I alluded in my note admits this interpretation. As my views of the relations of gall-formation to the theory of natural selection are clearly at variance with those of your correspondents, perhaps you will allow me space to give briefly the grounds upon which I base my conclusions.

There are in England about ninety well-known varieties of galls, and of this number fully a third are found in the oak. About half the oak-galls are formed on growing leaves. In nearly one-third of the total number the grub is hatched, and the gall is fashioned in a developing bud. We can readily imagine, in the case of a tree with deciduous leaves, that the presence of a few galls upon its foliage would not greatly affect its chances of survival, if its fitness was in other respects complete. It is otherwise when a gall occupies the position of a developing bud, especially when the bud is a terminal one. In this case there occurs coincidentally with, and as a result probably of, the adventitious formation, an arrest of normal development and growth. Indeed, I believe "the gnarled and twisted oak" owes many of its gnarls and most of the twists to the common oak-apple and other bud-galls. If a tree endowed with less developmental vigour and with fewer supplementary buds than the oak had been exposed to the repeated attacks of the insects for many generations in a struggle for existence, it would doubtless have long ago succumbed, and it would have done so by a process of natural selection operating in the ordinary manner, and not "at the end of a long lever of the wrong kind," whatever that may mean. This selective process in the case of gall-bearing trees has left possible traces of its action to-day, for I am unaware that any other English tree than the oak is attacked by terminal bud-galls. The terminal leaf-galls of certain Salices and Conifers can scarcely affect their growth and development to the same extent as the bud-galls.

When we compare pathological tumours in the higher animals with these vegetable excrescences, we must make due allowances for the different conditions under which each lives. I cannot then see that the "morphological specialization" of galls, which, for the most part, are composed of hypertrophied reproductions of the simpler vegetable tissues, is greater than that exhibited by man himself, when, for instance, he becomes the

involuntary host of Dr. Lewis's *Filaria*, and his leg the seat of *Elephantiasis lymphangiectodes*, accompanied by hypertrophy of many integumentary structures of the limb. Oak-spangles, on the other hand, are to my mind comparable to the circular nests of ringworm, or to the sprouting epithelium of a *Verruca necrogenetica*. Such comparisons may be of little scientific value, yet I take it they are as useful in their place as attempts to gauge the amount of "disinterestedness" shown by a cabbage when it becomes the unwilling host of the gall-producing *Ceuthorhynchus sulcicolis*.

W. AINSLIE HOLLIS.

Brighton, December 30, 1889.

#### The Evolution of Sex.

THE interesting note of Mr. M. S. Pembrey in your issue of January 2 (p. 199), induces me to draw the attention of your correspondent to a short paper of mine just published (or in course of publication) in the *Ibis*, where I communicated the experiences of a friend, who had hatched a series of parrot eggs, belonging to the genus *Electus*, in which the young males are green, the young females red. It is remarkable that by far the larger number of the birds hatched were males. In each case only two eggs were laid, and the breeder himself, without being able to tell why, is of opinion that nearly all his hatches consisted of male birds. As there are still many embryos of those *Electus* in my hands, the sex of which is not yet determined, I hope to be able to make known the result of my investigation later, whether the pairs are always males, or always females, or consist of a male and a female bird, at least sometimes. Meanwhile, I should be glad to hear if anything more is known about the sexes of birds which lay only two eggs at a time.

A. B. MEYER.

Royal Zoological Museum, Dresden, January 5.

#### "Manures and their Uses."

ALLOW me to thank the well-known writer "W." for his review of the above-mentioned book. "W." does not hold with the view that "farmyard manure is erroneously supposed to contain all the necessary plant-foods required for the growth of plants." I believe, with M. Ville and others, that "the farmer who uses nothing but farmyard manure exhausts his land." "W." speaks of this as an "obvious fallacy." If the statement is wrong, would "W." kindly answer the quotation given on p. 76 of the book in question. The quotation "runs" as follows:—

"M. Grandeau (the French agricultural authority) recently estimated that one year's crop in France represents 298,200 tons of phosphoric acid, of which only 151,200 tons were recovered from the stable dung, thus leaving a deficit of 147,000 tons, equal to over one million tons of superphosphate, to be made good by other means.

"M. Grandeau also estimated that the entire number of farm animals in France in 1882, representing a live weight of 6,240,430 tons, had accumulated from their food 193,453 tons of mineral matter containing 76,820 tons of phosphoric acid. These figures give some idea of the enormous quantities of phosphoric acid required to restore to the soil what is continually being carried away by the crops sold off the farm."

It must be borne in mind that in the above estimates, M. Grandeau includes the purchase of oil-cakes and other feeding stuffs. Therefore, if farmyard manure only contains about half the amount of phosphoric acid (to say nothing of nitrogen, potash, &c.) required to retain the land in a fertile condition, how can I have attached "too much prominence to chemical manures, and too little importance to stock-feeding as a manurial agency"?

A. B. GRIFFITHS.

[DR. GRIFFITHS assumes that because, as asserted by M. Grandeau, the balance of fertilizing matter in France is against the land, "the farmer who uses nothing but farmyard manure exhausts his land." This is arguing from general principles to special cases, and there is no sequence in his reasoning. A nation may be rushing to ruin, but that does not prevent an individual from growing rich. Phosphates and nitrates may be diminishing, but that does not prevent them from accumulating on any particular farm. We traverse Dr. Griffiths's statement without qualification, that the farmer who uses nothing else but farmyard manure exhausts his land. We believe he improves his land.—THE REVIEWER.]