

Two other natural-history articles are of botanical interest, dealing with the diseases of certain important plants. Both are from the pen of Dr. J. Brunchorst. The first (in Norwegian) is a revision of the plant-diseases of economic importance which occur in Norway, and gives the results of a special journey undertaken by the author for the purpose of investigating the diseases which affect the principal cultivated plants, and contains his observations upon barley, rye and oats, potatoes, clover, turnips, and kale, also upon natural pine-woods, fruit-trees, hops, and roses. In the majority of cases the mischief is done by fungi, which is also the case with the disease of the black-fir (*Pinus austriaca*), which forms the subject of Dr. Brunchorst's second memoir (in German). This disease, which attacks the needles and twigs of the trees, seems to have been very injurious; but the fungus which causes it cannot be identified further than that it is the pyrenidial stage of an Ascomycetan. It also attacks the dwarf pine (*Pinus montana*), which has been planted over a great extent of the west coast of Norway. This paper is illustrated with two plates.

The only other article in this Report is an account by M. A. Lorange of the discovery in a mound near the Karmsund of a portion of a vessel of the age of the Vikings; but the antiquary will also find some interesting objects figured upon two plates representing specimens presented to the Museum during the year.

MISCELLANEOUS.

On a new Parasite of Amphiuira. By J. WALTER FEWKES.

THE Secretary read a communication on the parasitism of a Crustacean in the brood-cavities of a common brittle-star (*Amphiura squamata*), which he had discovered while at work in the Marine Laboratory at Newport.

The Ophiurans, or brittle-stars, have two methods of development or metamorphosis, known as the direct and indirect. In the indirect the young passes through a stage called the pluteus, in which a provisional organism is developed from which the young form by budding, the provisional organism or pluteus being eventually absorbed by the growing young of the brittle-star. Our common *Ophiopholis* (*O. aculeata*) has such a pluteus. In the case of other Ophiurans, such as *Amphiura*, however, there is no free pluteus in their metamorphosis, but the young are developed, without nomadic stages, in special sacs of the mother, called brood-sacs, of which there are ten situated in pairs on each side of the [bases of the] arms. The young *Amphiura* passes its early life in these sacs, at first attached by an umbilicus, afterwards free, and remains there until it

has reached a considerable size. Morphologically both forms of metamorphosis are identical; but while certain structures, as, for instance, parts of the calcareous framework of the pluteus, are recognizable, a nomadic pluteus is never formed in this genus.

In collecting adult *Amphiurans* in order to discover new stages in the development of the young my attention was often attracted to certain adults of this genus in which a portion of the upper (aboral) surface of the body has a reddish colour, while in most specimens the body is chocolate-brown. This coloration was noticed to be ordinarily limited to a marginal region of the body just between the radial shields.

It was invariably found, when those adult *Amphiuræ* with reddish coloration on the aboral surface of the body were dissected, that young were absent from the brood-sacs. It was, moreover, almost invariably found that in these adults the ovary had suffered a change and had degenerated into an amorphous mass in which ova were not recognizable. In the brood-sacs of such, instead of young *Amphiura* there were found small packets of pink-coloured ova, which, when seen through the wall of the body, impart the reddish colour to the aboral body-wall. In addition to these packets of ova it was likewise found that the brood-cavities of many of the specimens thus abnormally coloured harboured a small Crustacean. In an examination of the pinkish clusters of ova in the brood-sac of the *Amphiura* it was discovered that they are in all conditions of growth from the first stages of segmentation into a well-formed Nauplius. Young Crustaceans free from the packet of ova were also found in great numbers in the brood-sacs. These adults were identified as belonging to the group of Crustacea called the Copepoda.

An interpretation of the above facts seems to be that we have here a strange instance of parasitism. It is also thought to be unique among the Echinoderms. Although many genera of parasitic Copepods are known, I am not familiar with recorded instances where these parasitic Crustaceans enter the brood-sac of an *Amphiura* and destroy the virility of its host for the good of its own offspring. Many instances of Crustacean parasites castrating other Crustaceans have been recorded by Giard; but in these cases it has not been shown that the castration of the host is a direct benefit to the offspring of the parasite itself. In *Amphiura*, however, we have a condition where we can legitimately conclude that the amorphous condition of the ovary of the *Amphiura* is the direct result of the presence of the mother Crustacean in the brood-cavity of the *Amphiura*. We may suppose that the parent of the Crustacean made her way through the genital slits of the Echinoderm into the brood-sacs, and there spayed the *Amphiura*. Packets of the ova were left in the brood-sacs to develop. With the destruction of the possibility of offspring in *Amphiura* within her own brood-sacs the future life of the young Crustacea was assured, and

we may readily see, if the precaution of preventing the development of young *Amphiura* had not been taken, the young Crustaceans might have fallen easy prey to the vigorously growing young of the brittle-star.

Many questions of theoretical interest suggest themselves in regard to the curious condition of parasitism mentioned above. How by a theory of the advantage which has come to the Crustacean has the life within the brood-sac of *Amphiura* originated? That it is a manifest protection to the young Crustacean to be sheltered by its host appears self-evident, and one can on this ground find abundant cause for the mode of life which has been mentioned. Moreover, it is also a great advantage that the young of the *Amphiura* be destroyed. We may then suppose that in the evolution of this manner of life, after the Crustacean has found a home in the brood-sac of the brittle-star, the ovaries of the *Amphiura* may have been aborted by the parasite, and this habit of destroying the ovary has led to a survival of the young Crustacean. That habit becoming hereditary has led to the condition of life as it now exists. Whether the ovaries were first used as food, and in that way the habit of spaying the *Amphiura* arose, I cannot say. It is possible that they offered a tempting morsel to the Crustacean, and the advantage thus gained by the parasite over others has led through heredity to the condition which we at present find.—*Proc. Bost. Soc. Nat. Hist.* vol. xxiv, p. 31.

The Bressa Prize.

The Royal Academy of Sciences of Turin gives notice that from the 1st of January, 1887, the new term for competition for the seventh Bressa Prize has begun, to which, according to the testator's will, scientific men and inventors of all nations will be admitted. A prize will therefore be given to the scientific author or inventor, whatever be his nationality, who during the years 1887-90, "according to the judgment of the Royal Academy of Sciences of Turin, shall have made the most important and useful discovery, or published the most valuable work on physical and experimental science, natural history, mathematics, chemistry, physiology, and pathology, as well as geology, history, geography, and statistics."

The term will be closed at the end of December 1890.

The value of the prize amounts to 12,000 Italian lire.

The prize will in no case be given to any of the National Members of the Academy of Turin, resident or non-resident.

The President of the R. Academy,
A. GENOCCHI.

Turin, January 1st, 1889.



Fewkes, Jesse Walter. 1889. "On a new parasite of *Amphiura*." *The Annals and magazine of natural history; zoology, botany, and geology* 3, 154–156.

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