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others, in pl. xxvii., drawn by Dr. Malcolmson. Prof. T. Rupert Jones also is thanked for help given.

5. "A List of Irish Coleoptera collected mainly by the late Robert Patterson, Esq., F.R.S., in the year 1829." This useful contribution to the series of local lists in Natural History, besides its intrinsic value, shows "how much could be accomplished in a year by one quite young and fully occupied in business matters. This, too, at a time when books of reference were much less accessible than at present."

MISCELLANEOUS.

On the Significance of Conjugation in the Infusoria.

By Dr. A. GRUBER.

IN what follows I will briefly communicate an observation which seems suited to throw some light upon the still obscure nature of the conjugation of the Infusoria. My investigations relate to *Paramœcium aurelia*, of which Infusorian I have been able to employ a very considerable number of conjugated individuals for preparations. It is well known that Ickeli* has lately stated that from his preparations he has been able to conclude that there is a migration of the nucleoli from one individual to the other, a process which Bütschli† had previously supposed to take place in the same Infusorian. The main point of the whole process has, however, escaped both these naturalists, whose publications I shall refer to in more detail elsewhere. This consists in the fact that the nucleoli of the two individuals come into intimate contact with each other, copulate with each other.

The two conjugated individuals of *Paramœcium* are closely united together, besides their anterior parts, at a point in the hinder third of the body. To this point, which is indicated by a sort of annular swelling, there moves from the left and right a nucleolus converted into a striated spindle (Bütschli's "Nucleoluskapsel"); the two bodies touch one another exactly in the bridge of communication, at first only by their apices and then gradually more intimately, so that they appear mutually flattened, and finally two bodies originate from them which meet together by their broader ends, and exactly fill up the above-mentioned bridge of communication.

Without going into minute details and into the further course of the process I will content myself with having established the fact that in *Paramœcium aurelia* the conjugation brings about an intermixture of nuclear substance from both sides; and this seems to me to explain much or most of what was enigmatical to us in the phenomena of conjugation, and to furnish us with a firm support for the view which brings the conjugation of the Infusoria into direct agreement with the sexual reproduction of the Metazoa. As in the

* "Ueber die Kernverhältnisse der Infusorien," Zool. Anzeiger, Jahrg. vii. 1884, p. 491.

† "Studien über die ersten Entwicklungsvorgänge &c.," Abh. Senck. naturf. Gesellsch. Bd. x. 1876.

Metazoon the nuclei of the germ-cells, so here the so-called nucleoli come into intimate contact, and the result here as there is an intermixture of different germ-plasmas. With Weismann, I am convinced that this result is the purpose of both sexual fecundation and conjugation, and the condition of the variability of the individuals, without which species-production would be impossible.

With the certainty that in the phenomena of conjugation the essential thing is the exchange of nuclear substance in the two conjugated individuals, we stand on much more solid ground for the explanation of these processes, and may for the future drop all more indefinite notions. Among these we have as the chief the most generally entertained opinion, which indeed is apparently supported by facts, that the purpose of conjugation is the rejuvenescence of Infusoria exhausted by continual division *.—*Berichten der naturf. Gesellschaft zu Freiburg I. B. Band ii. (1886) Heft 1.*

On the Influence of certain Rhizocephalous Parasites upon the External Sexual Characters of their Host. By M. A. GIARD.

Most of the Rhizocephala parasitic upon the Decapod Crustacea occasion the atrophy of the genital glands of their host without the external sexual characters of the latter undergoing the least modification. Thus *Sacculina triangularis*, Anderson, which occurs pretty frequently at the Poulignan, and more rarely at Concarneau, upon *Platycarcinus pagurus*, affects both males and females, widely projecting on each side of the narrow tail of the former, while it is entirely protected by the broader appendage of the other sex.

But this is not always the case, and in some instances the parasite by its presence causes modifications so extensive that the infested males become like the females in types in which sexual dimorphism is most strongly marked. A very distinct example of this is furnished by *Sacculina Fraissei*, sp. nov., a parasite of *Stenorhynchus phalangium*, Penn. This *Sacculina*, indicated but not described by Fraisse in the Bay of Naples, occurs commonly at Concarneau, in the Baie de la Forest. We may estimate at one in fifty the number of *Stenorhynchi* infested by this Rhizocephalan. As in the case of the *Sacculina* of *Carcinus maenas*, the parasite arrives at its complete formation during the period of reproduction of the crab, that is to say, in the present case, during the months of June and July.

Sacculina Fraissei is easily distinguished from other species of the same genus by its external form and its organization. It is entirely concealed in the kind of box formed by the tail of the crab and the sternal plastron. Its outline is heart-shaped. The cloacal aperture is nearly sessile, irregularly triangular in the young. The chitinous ring which surrounds the peduncle is very simple and not strongly marked. The peduncle is short; the roots are thicker and more irregularly ramified than those of *S. Carcini*; the collateral glands are well developed and situated upon the sides and towards the upper third of the height. The orientation is the same as that of *Sacculina carcini*. The nearly spherical testes are situated at the

* The author promises a more detailed paper with figures.