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Parthenogenesis

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We should mention that the numerous illustrations, though not original, are taken from a variety of sources, many of which are not very easily accessible, and a considerable number from American periodicals.

There is much work still to be done in entomology, and as each generation of entomologists starts with far greater facilities for work than their predecessors have enjoyed, it is from the younger entomologists, like Mr. Carpenter, that we may confidently expect a large increase of our knowledge of the insect-world.

Cries and Call-notes of Birds: with Musical Illustrations.

By C. A. WITCHELL. 8vo. Upcott Gill, 1899.

THE study which Mr. Witchell has for years past devoted to the songs and notes of birds, and his musical training, have fitted him beyond all other ornithologists to produce a reliable popular work on the subject.

To those who have read with pleasure Mr. Witchell's most fascinating book 'The Evolution of Bird-Song,' the present more modest little work will be welcome; it occupies only eighty pages, but these are crowded with information. The effort to record the Nightingale's song in musical notation is a marvel of patient effort and indomitable pluck on the part of the author. We would recommend all lovers of British birds to spend a shilling in securing this valuable addition to their libraries.

MISCELLANEOUS.

Parthenogenesis. By THOMAS MEEHAN.

It is about two hundred years ago since Camerarius recorded the fact that female mulberries and other trees would produce fruit without pollinization, though such fruit was sterile. These observations have since been abundantly confirmed. The necessity of pollen to fertile seed came to be regarded as absolute law until some fifty years ago, when the Curator at Kew, Mr. John Smith, announced that an Australian plant of which he had but one female specimen perfected its seeds. It proved to be a new Euphorbiaceæ, and he named it *Calebogyne ilicifolia*—the generic name from its supposed parthenogenetal character.

The author of this paper was a student in Kew at that time, and well remembers the incredulity with which the announcement was received, that nature should seem to make a universal law in relation to method of reproduction, and yet make a striking exception in this case. Nature furnishes infinite variation, but these variations seem to be only of one general plan. It seemed more probable that, in some method unexplained, pollen had been formed, and really pollinated the embryo. It does not appear that any further observations on this plant were made at Kew, or, if made, recorded.

Strasburger took up the subject again in 1878; but though my good friend Mr. George Nicholson, Curator of Kew, writes under date of April 10, 1897, that "the whole business has been threshed out by Strasburger," the latter seems to be more concerned about

the cell-development than the manner of its fertilization. This is especially true of that part devoted to the castor-oil plant, *Ricinus communis*. In *Calebogyne* he insists that the true embryo does not develop, but that the seeds proceed from adventitious buds from the wall of the ovary. One may conceive of them as bulblets, analogous to what we find in viviparous flowers; but he does not explain how cotyledonous seeds are constructed in this way.

In 1894 the author of this paper decided to make for himself careful observations on *Ricinus*. A number of plants were set out in a mass where he could easily watch them. Every male bud that could be observed was rubbed away before expansion. For all this an abundance of seed matured. It was found subsequently that there were other plants within a quarter of a mile. It was thought best to repeat the observations another year. The following year no plants were near but those under observation, and it began to look as if the plants had no use for pollen. Still there seemed doubt, and the observations were continued yearly to the end of 1897—all with the same result. Dr. Ida A. Keller, Professor of Biology in the Philadelphia Girls' High School, an experienced microscopist, aided me considerably in the observations made, and only for the fact that in one of her acute examinations she discovered a pollen-tube at work on the ovarium, there would have seemed no room for doubt that pollen was unnecessary for the production of perfect seed in *Ricinus*. It was determined to try once more. The past year (1898) only one plant was allowed to grow and only one flower-spike permitted to remain. All the others were cut away in the bud. This permitted closer examination, which was made almost daily. I noted for the first time that there were on the pedicels with the female flowers buds scarcely larger than pin-heads, and, under a strong lens, evidently antheriferous. These were carefully cut away. As the female flowers opened they all withered, unlike their fertility in former years. There seemed no doubt that pollen was essential. After half the spike had fallen away, the upper portion—say some twenty flowers—showed a disposition to permanence. The pretty fringed pistils protruded and continued perfect for many days. Finally, the capsules enlarged until they had about reached the usual dimensions. Now it seemed as if the plant would produce seed without the aid of pollen. After turning brown and seemingly ripe they were found to be as empty as Camerarius's mulberries were.

While under the impression during the earlier years of these observations that *Ricinus* was fruiting in the absence of pollen, I was encouraged by observations seemingly confirmatory by Judge Day, of Buffalo, and Prof. Greene, of Washington, on other plants. At the same time I had noticed that solitary female plants of *Ginkgo biloba* were fruiting abundantly in Germantown, while the only known male plant was at Woodlands, some ten miles away. Recently Japan botanists have discovered spiral coils of spermatozoids in the generative cells of *Ginkgo*, and others have observed them in *Cycas revoluta*.

The conclusion reached by the author is that though for several

years he regarded the castor-oil plant, *Ricinus communis*, as a genuine case of parthenogenesis, the past year's experience still leaves the matter open to doubt. If it be true that the female flowers of *Cycas revoluta* can generate spermatozooids in their ovaries, and thus self-fertilize the ova, the occurrence must be rare. In this vicinity old specimens of this plant are frequently seed-bearing *apparently*, but in every case examined by the author they were found to have only empty capsules.

It seems to the author that the subject of parthenogenesis is by no means thoroughly "threshed out," and the object of this paper is to encourage continued observations.—*Proc. Acad. Nat. Sci. Philad.* 1899, pp. 97-99.

Relations of the Land-Molluscan Fauna of South America.

At a meeting of the Academy of Natural Sciences of Philadelphia on the 23rd May, 1899, Mr. H. A. Pilsbry spoke of the extrinsic relations of the land-molluscan fauna of South America, recounting and commenting upon the various theories advanced to account for the relations existing between the South-American, African, and Australo-Zealandic faunas. The evidence of former Austral land connecting South America with Australasia, derived from a study of the Bulimulidæ, the Macroogona, &c., was detailed. The speaker gave his reasons for preferring the hypothesis of a former extension of Antarctic land to that of a South-Pacific continent, as advocated by Prof. Hutton* and some others. He claimed that the present fauna of Southern Polynesia was not consistent with Hutton's supposition that these islands had been submerged, and thus their fauna destroyed, on the sinking of the supposed Pacific continent entirely below the sea, the present "islands being merely outgrowths on its submerged back." Some Polynesian groups, such as *Partula*, belong to very primitive, and therefore ancient, groups, unknown in any other area, and indicating great antiquity for the Polynesian archipelagos†. Neither is the present fauna of Polynesia consistent with the hypothesis that these islands are unsubmerged remnants of a Pacific continent.

The enigmatic relations of the freshwater fishes, snails, and the terrestrial Streptaxidæ of tropical South America with the African fauna were discussed.

The speaker considered the neotropical region of Wallace to be composite, the Antillean and Southern Mexican area representing a tract independent from North and South America in Mesozoic and perhaps earlier time, on which the faunal problems had been independently worked out.—*Proc. Acad. Nat. Sci. Philad.* 1899, p. 226.

* See *Proc. Linn. Soc. New South Wales*, 1896, p. 36, for an able paper advocating Prof. Hutton's views, an abstract of which appeared in the 'Annals' for July 1896, p. 120.

† *Partula*, like the allied *Achatinella* of the Hawaiian group, has a bottle-shaped kidney with direct, not reflexed, ureter, as in *Limnæa*. These forms have no relations with the Bulimulidæ and Achatinidæ, with which conchologists associate them, but lie at the base of the terrestrial pulmonate tree.