

of the hypopharyngeal and peripharyngeal grooves. 6. The œsophageal aperture &c., magnified. 7. Dorsal tubercle, magnified. 8. Concretions from the renal organ.

Explanation of the Lettering.

<i>d. l.</i> , the dorsal lamina.	<i>p. a.</i> , peritubercular area.
<i>d. t.</i> , the dorsal tubercle.	<i>p. p.</i> , peripharyngeal bands.
<i>en.</i> , endostyle.	<i>ren.</i> , renal organ.
<i>h. m.</i> , the horizontal membrane of the branchial sac.	<i>sg.</i> , the stigmata of the branchial sac.
<i>i.</i> , intestine.	<i>st.</i> , stomach.
<i>i. l.</i> , internal longitudinal bar.	<i>tn.</i> , <i>tn.</i> ', <i>tn.</i> ', tentacles.
<i>n. g.</i> , the nerve-ganglion.	<i>tr.</i> , <i>tr.</i> ', <i>tr.</i> ', the transverse vessels of the branchial sac.
<i>ov.</i> , the genital glands.	<i>z.</i> , the zona præbranchialis.

On a probable Case of Parthenogenesis in the House-Spider,
(*Tegenaria Guyonii*). By F. MAULE CAMPBELL, F.L.S.

[Read June 15, 1882.]

FOR some years past I have confined Spiders with the view of observing their habits. During the autumn of 1878 I imprisoned an adult female *Tegenaria Guyonii*, Guérin (= *T. domestica*, Blackw.), just after her last moult. In the following May she laid eggs, which were hatched; and as her capture had followed so closely on the adult stage, I could scarcely think she had been fecundated, and suspected that the cause of fertility was agamic reproduction.

In the autumn of 1880 I confined three females of the same species as above, having previously satisfied myself as to their immaturity. They moulted successfully at the end of September; but two died during the winter, and the third (May 1881) laid eggs which were non-productive. During the same month the first-mentioned Spider, a few days prior to death, made a cocoon, with the same result. The eggs became shrivelled and hard, while a few retained nearly their original form, but turned green-black in colour. A female (*T. Guyonii*, Guérin) which I had caught adult in December 1880, gave me in July 1881 a large brood. In May 1881 I confined two immature females of the same species. Both cast their skins twice, the last occasion being in September. One died during the winter; and the other has afforded the material for this paper.

I kept this Spider like the others, each one in a separate flint-glass bottle, $4\frac{1}{2}$ inches high from shoulder to base, and 4 inches in diameter; I covered the mouth with a glass slip. As soon as she became accustomed to her prison, she began to fasten threads,

as high as her spinnerets could reach, from the side to the bottom of the bottle. Each thread enabled her to carry another still higher, until in about six weeks, always working at night, she reached the shoulder. By that time the sides were speckled with attachments, there being as many as seventy in one square half inch. Her home soon became utterly unlike the well-known cob of this species, consisting as it did of a cube of confused cross threads, which were frequently broken by the insects given her, and her energetic pursuit of them. She often was quite at a loss as to the direction in which her prey had settled, as might be expected from her inexperienced use of a net which was specially adapted to her new condition of life. Sometimes during an exciting chase, when at the bottom of the bottle, she would move her whole body from side to side in a slanting position, evidently making the best use of her sight. She would then make a dash to strike at her object with her front legs; and her spinnerets would be widely separated, trailing threads at each movement of the abdomen. Spiders live long without food; and I was careful not to overfeed. Her usual allowance was a blow-fly every second or third day, and an occasional daddy-long-legs when in season. During the winter she sometimes fasted for a week; for the relays of flies which I had to rear did not always follow. From February 1882 I fed her more regularly.

The habits of the females of this species, spending, as they do, a comparatively sedentary life in dry places, renders it difficult to see how they can obtain water, except during their occasional excursions; yet a frequent supply or a damp atmosphere is necessary to many Spiders. I have kept a *T. Guyonii* ♀ 27 months without any liquid except that which she derived from insects. In the case I am detailing, it was, however, required. In December, after six weeks' absence, I found the Spider lying helpless at the bottom of the bottle, with her legs drawn close to her body; I immediately filled a tube with water, and dropped some on her back and in front of her. She quickly balanced herself, and wetting the last joints of her palpi, placed them on her maxillæ. This she did five times, when she advanced, and lowered her whole body so that the maxillæ were dipped in the water. Thus she remained apparently motionless for a few seconds, when she raised herself to her normal position, and repeated the draught after an interval of a few minutes. Shortly afterwards she mounted to her usual roost at the shoulder of the bottle, with her abdomen considerably distended. On removing the glass cover a few days later, I

found adhering to it her first and third leg, which were broken off just below the trochanter. I suppose the tarsi had been caught against the rim of the bottle, and she had dismembered herself to obtain freedom, a common occurrence with Spiders. Towards the end of March she began to strengthen the supports to that part of the web which was her usual resting-place. This was done by spinning from the bottom of the bottle an irregular loose vertical shaft, which was partly covered with the remains of her victims, the threads taking no particular direction. Her web was now still more unlike the cob of her species; but I have found that other *T. Guyonii*, when about to lay eggs in the same-shaped vessel, made the same structure. On the 7th of April, after an absence of three days, I found she had woven the ordinary cocoon, viz. two sheets of silk with the eggs between them. She must have been disturbed, probably by a strong fly, in her first attempts; for a few eggs were hanging loosely on threads away from the rest. I found her dead on the 10th of May, and put her in spirits; but I think, from dissection, she died prior to that date. On the 7th of June I thought there was some movement in the cocoon, when the two sheets were carefully separated; then I found that two Spiders were hatched, twelve eggs still retained vitality, while the rest were hard and shrivelled.

The fertility of this Spider after a confinement of eleven months, during which time she twice moulted, can only be explained by one of the following alternative causes:—(1) that she was impregnated previous to the casting of the two exuviae, in an early and therefore immature stage; (2) that parthenogenesis occurs in the *Araneidea*.

The researches of Mégnin *, Kramer †, Haller ‡, and Michael § show that the females of some *Acarina*, and more especially of the *Dermaleichidæ*, couple with the males prior to their final moult, and that practically there are two stages of sexual maturity:—1st, of the “vulve d’accouplement;” 2nd, of the “vulve de ponte.” On the other side, Mr. Beck || and, lately, M. Berlese ¶ have

* ‘Les Parasites et les Maladies parasitaires,’ pp. 180–220, and *Journ. Anat. et Phys.* 1872, p. 337, 1873, p. 369, and 1874, p. 225.

† Giebel’s *Zeit. für ges. Naturwiss.* 3. Folge, 1881, vol. vi. pp. 417–451.

‡ “Ueber d. Bau d. vogelbewohnenden Sarcoptiden,” *Zeit. f. wiss. Zool.* 1881, Bd. xxxvi. p. 366.

§ “On the Reproductive System of some of the *Acarina*,” *Journ. Quek. Micr. Club*, Nov. 1879, vol. v.

|| “A short Description of *Acarus* and its Agamic Reproduction,” *Journ. Micr. Sci.* vol. xiv. p. 30.

¶ “Il polimorfismo e la partenogenesi di alcuni acari,” *Bull. Soc. Ent. Ital.*, ann. xiii. p. 290.

related cases of parthenogenesis among the Acari. Both hypotheses are therefore supported by analogy from a related group. Unfortunately, disintegration has prevented a satisfactory examination of the spermathecæ of the Spider in question; but I am inclined to believe that the case is one of agamic reproduction, inasmuch as I can find no lumen in the exuvia through which impregnation could have taken place. Bertkau states ("Ueber den Generationsapparat der Araneiden," Archiv für Naturgesch., vol. 1, year 41, p. 253):—"Nur so viel ist gewiss, dass die Spinnen mit oder nach der letzten Häutung geschlechtsreif werden."

I purpose to continue my investigations on this subject, and hope that others may do the same.

Description of new Species of *Donax* in the Collection of the Author. By SYLVANUS HANLEY, F.L.S.

[Read June 1, 1882.]

(PLATE XII.)

SINCE 1843, when I first described three new species of *Donax*, four important monographs have appeared of this now large genus. The first, by Reeve, strangely ignored the paper I had published in the 'Proceedings of the Zoological Society' for 1845, but figured the same specimens with the same names from the Cuminian collection. The last, and critically the best, is the posthumous production of the late Victor Bertin, who declares that both Reeve and Sowerby have wrongly delineated my *Donax assimilis*. Premising, therefore, that the *Donaces* which follow cannot even be regarded as varieties of any delineated in the four monographs above alluded to (so peculiar are they in their form and proportions), I will proceed to describe them:—

DONAX MESODESMOIDES, n. sp. (Plate XII. fig. 1.)

T. magna, valida, oblonga, satis convexa, curvato-subcuneiformis, valde inæquilateralis, nitida, lævis, sub epidermide cinereo-flavescente extus omnino candida, intus præcipue purpurascens; lateris antici extremitas attenuato-rotundata, lateris postici rotundato-subtruncata. Area postica angusta rugis erectis flexuosis subremotis transversis, lineisque radiantibus humilioribus decussata. Margo dorsalis antice incurvatus, modice declivis; margo ven-



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