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Notes on Megachile centuncularis

Thos. G. Gentry

paler than the wings, but I can not discover any hinder marginal line. *Al. ex.* $\frac{3}{16}$ inch.

The larva is white, without maculae, but with the anterior margin of the first segment brown.

A. hydrangœella. N. sp.

The mine and larva only of this species is known, and I have never succeeded in rearing the imago. The mine, larva and case resemble those of *A. viticordifoliella*, but are perhaps a little smaller. It mines the leaves of the wild *Hydrangea (H. nivea.)*

Dr. Clemens states that the species described by him mine the leaves of the various plants in the latter part of August and in September, from which I infer that he found them only at that time. But the mines of all the species may be found as early as the first of July, and in increasing numbers from that time until the fall of the leaves. I have reared *A. cornifoliella* in the latter part of July, from leaves gathered in that month, and have found the mines and larvae of all the other species, though I have only succeeded in rearing the other species in the spring from mines gathered in the fall.

NOTES ON THE "LIST" OF 1868.

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Preparatory to a fresh edition of the "List of Lep.," of 1868, a few memoranda of the necessary changes will be published.

Sesia uniformis, p iii. This species is distinct from *thysbe*, and has been noticed by Mr. Lintner in his valuable "Entomological Contributions." Mr. Couper found it on Anticosti. This can not be *Sesia ruficaudis* Kirby, the description of which is given on p. 27 of the "Synonymical Catalogue" of 1865. Kirby says: two first segments of the body yellow olive, two next black, the rest ferruginous with yellow olive spots. *Uniformis* has the first segments yellow olive, the next deep ferruginous, the next again olive, and the anal hairs black, with ferruginous central tuft. In fact, Kirby's description rather resembles *diffinis* in the body parts. And from his comparison with *fuciformis*, we should think

at once of *diffinis*. But the terminal segments in *diffinis* are not "ferruginous" any more than in *uniformis*, and so Kirby may have had a boreal species we do not yet know before him. From his description there is no more correspondence with *uniformis* than with *thysbe;* rather does his description agree with *fuscicaudis* as to the abdomen terminally.

Cressonia juglandis, p. iv. To this species must be cited *Sm. pallens* of Mr. Strecker, whose figure represents a pale ♀ specimen of *C. juglandis*, without the median shade on the forewings. Belfrage has sent *C. juglandis* from Texas.

Dysodea || p. vi. This generic name is preoccupied and must give way to that of *Platythyris*. Mr. Walker's type of *Varnia* appears distinct. We have probably but one species which should be known as *Platythyris oculatana*. Boisduval's figure and description of *Vitrina* do not agree with our species, and probably *vitrina* represents *oculatana* in Europe. Much confusion has occurred through Dr. Clemens having described the species figured by us, Am. Lyc. Nat. Hist., N. Y., vol. viii, pl. 13, figs. 4–5, as one of the Tortricidæ, and without referring to Boisduval's original illustration of the genus. A second species is afterwards described by Dr. Clemens under the name of *Dysodia margaritana*, which I have never seen. Consult Am. Soc. Belge, T. 7, Pl. 1, for an illustration ot the embryonic stages of *Thyris*. They seem to correspond generally very well with Dr. Clemens' characters of the larva of *Dysodea*.

NOTES ON MEGACHILE CENTUNCULARIS.

BY THOS. G. GENTRY. GERMANTOWN, PA.

Since so much has been written upon the habits of our ordinary Leaf-cutting Bee, it would seem presumptuous for me to offer anything further in connection therewith. But a few facts which came to my notice recently are sufficiently interesting and important to merit publication.

During the latter part of June, 1873, several cells, a half a dozen in number, were sent to me by a friend, who had accidentally brought them to light while digging underneath the shade of a *Spiræa corymbosa*. They were found in close proximity to each other, arranged in a nearly horizontal position, at a depth of three inches below the surface of the

ground. The soil was comparatively solid. From the freshness of the leaves which composed the cells it would seem that the work had but lately been accomplished, but after the examination of a few, it was evident that some time had elapsed, since the larvae had attained to considerable dimensions.

The cells were nearly three-quarters of an inch in length, with a diameter of one-fourth of an inch. They were constructed of nearly perfect leaves of *Spiraea corymbosa*, instead of those of the various species of Rose. The outermost circle of leaves, three in number, had their margins slightly overlapping on the exterior, each piece forming an arc of a circle of 120 degrees. Within these were other three, arranged alternately with them; others, again, alternating with the latter, and so on until there were no less than six circles, having eighteen pieces in all. Each succeeding individual layer from without inwardly projected but slightly beyond its predecessor, having but a slight resemblance "to a long sleeve with folds upon it," as has been affirmed by writers. The mouth of each cell was closed by six circular pieces of leaves, nipped from the same plants. These were a trifle larger than the mouth of the cell, and when in position presented a concave surface facing outwardly. It is obvious that the whole structure is a striking proof of adaptation to an end. If the cell had been arranged vertically, its structure would doubtless have afforded water a ready access to the larva and its food, and thus have defeated the object which nature had in view. In the horizontal position the tile-like arrangement in the exterior, acts as a sort of roof by which the water is turned off. The concave arrangement of the circular pieces subserves a similar purpose. The freshness of the leaves was due, no doubt, to the protection which the enveloping earth afforded. The chemical rays of sunlight, which act upon the parenchymatous material of the leaf, when deprived of its vitality, converting the green and granular chlorophyl into others of a brownish hue, operate with less intensity at the depth of three inches. The comparative absence of moisture in the ground, no doubt, prevents oxidation; there being ample moisture at the same time to insure softness and prevent rigidity.

During the early part of last April (1874), several cells were brought to me by one of my pupils, which, on a superficial examination, appeared to be the mud cells of our ordinary *Pelopæus*, the mud-dauber. They were found adherent to the rafters of an unplastered attic. The cells were arranged side by side in numbers of three. On the exterior there

were no shallow grooves, denoting lines of demarcation. With this unimportant difference, the general outline of the mud mass, with its combination of pellets, was exactly similar to that constructed by the mud-dauber. Had the lines of separation existed, I should have had no hesitancy in characterizing it as a case either of usurpation of instinct upon the part of the *Megachile*, or one of confiscation of property.

Within, exposed to view by detachment from the aforesaid rafters, were what I supposed to be the leafy cells of *Megachile*. The length of these and the peculiar disposition of their parts, materially different from what I had always observed, operated upon my mind to such an extent that I was almost constrained to believe that I had met with something altogether new to science, or else that I had been fortunate enough to discover a species of *Pelopæus* with *Megachile*-like habits.

Each cell was one and one-eighth inches in length, with a diameter slightly exceeding one-fourth of an inch. It was built of elliptical pieces snipped from the leaves of a species of *Spiræa (S. corymbosa*, it seemed to me.) The pieces were of less dimensions than those before alluded to, and arranged somewhat on a similar plan, except that there was a strong appearance of a double cell, as if the inferior concavity of one cell had been deposited in the superior concavity or mouth of the other. This resemblance held true to a certain extent, but the absence of a clear line of division between the two seemed to militate against the idea of a double arrangement.

Having kept a few of the cells a reasonable length of time, until all hope of seeing insects emerge therefrom had vanished, I began the work of destruction by carefully pulling some of them to pieces. While engaged in my labor I was led to notice the comparative ease with which each relative structure separated in the middle. Within the aperture of one cell was a cylindrical pouch, composed of pure silk, glazed within by an oily secretion from the larva. This containsd a perfect, but dead bee, which was readily identified as *Megachile centuncularis*. The lower half of the same enclosed a similar silken sack, with fragments of legs, wings, antennæ and complete body segments, with a mass of debris which showed the clearest evidence of the ravages of some ruthless destroyer. Under a glass of moderate power, I had little difficulty in recognizing the fragments as parts of a *Megachile* similar to the above.

This last fact impressed me as peculiarly interesting and novel, as showing the economy which exists and is practiced among certain

individuals of this species. To construct the inner leafy cells, with their numerous parts, is a labor of little moment when contrasted with the hours that must be spent in moulding the clay for the outer side into small pellets, and then adjusting them to their proper positions. The existence of two bees in separate cases of silk, one above the other, in the same earthy apartment, seems to imply the existence of a double leafy cell, even though a partition between the two should be wanting.

It would appear that the deposition of one cell upon another would defeat the object which the mother *Megachile* had in view. On the supposition that oviposition in the upper cell took place subsequently to that in the lower, the time of leaving the egg would be earlier in the latter, the larva would sooner mature, and the perfect insect would be prepared to leave its prison-house anterior to its associate, and, unable to effect its exit by reason of the narrowness of its domicile, would perish. This, doubtless, would be the upshot of the affair if similar cells in like situations should be built in the summer season. But as far as I have had any experience in the matter, the summer abodes of *Megachile* are single, a few inches below the surface of the ground, and generally under the shelter of some protecting shrub, where the warm rays of the sun can not effect any mischief. This site is doubtless well selected for the reasons above adduced.

There are usually two broods of this species in a season; a summer brood, which makes its appearance early in July, and a spring brood which has survived the winter in its double cell of earth and leaves. It is possible that the larva, after having exhausted its stock of honey and pollen, its natural food early in the fall, passes into the condition of a pupa, and thus remains until awakened from its sleep by the genial warmth of spring.

In the cells designed for the winter accommodation of the species, the double arrangement of the inner cells will not materially affect the original purpose, since both insects will have passed through the cycle of transformations, and when the suitable time shall have arrived for their departure, the one occupying the upper cell will have made its way out and thus left a clear passage for the one below.

The absence of a line of separation between the two cells appears to indicate that the food had been deposited in the lower cell, and two eggs instead of one had been left in mistake. Where it is the custom of the insect to deposit but one egg, instinct teaches it to collect just enough

food to provide for the sustenance of the larva to which it gives birth; the two eggs in the present cases were deposited through some inadvertence upon the part of the insect, and it does not seem wise to conclude that a similar inadvertency had led to an accumulation of a double portion of food. If this double brood had been the result of mistake, it is not possible that several mistakes of a similar kind would have occurred, since it was my good fortune to meet with unoccupied cells that showed evidence of being once occupied.

If two eggs are deposited within the same cell, there must be collected a double quantity of pollen and honey for the nourishment of the larvæ. The one which attained to full growth first would, no doubt, seek a clear space in which to spin its covering, and this would be afforded by the upper part of the tube or upper cell. The other, after having made a sufficient space for this essential operation by the consumption of the remaining food, would accomplish the task therein.

Some cells, which it was my privilege to examine, exhibited faint tracings of a partition-like arrangement between them. A portion of the debris in the lower cell, to which reference has been previously made, may have been due to the comminution of the leaves forming the separating layers, through some cause or other. But this I am unable to substantiate. If such should prove to be the case by future observations, there is no doubt that there will be found to exist a separate accumulation of pollen and honey in each cell.

After a little reflection, there seems to be an offset to a portion of this argument. May it not be possible that after the two larvæ had matured into perfect insects, the more powerful one overcame the weaker, and that the fragments of wings, legs, body segments, &c., are the sad trophies of such a conflict? This point would be worthy of acceptance if every cell which was examined had betrayed similar evidences. But it was not the case. It only remains, then, to assume one of two opinions—either that the two ova were deposited upon a double allowance of food, so that the larvæ, when hatched, should find ample sustenance to reach maturity, and subsequently had constructed their silken cocoons in their respective positions, said positions being determined upon by priority of growth; or, that a double cell was built, one on the top of the other, each properly victualled and provided with an ovum.