

Entomology.

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HARVESTING ANTS.*

The author of the "Proverbs," in his well-known admonition addressed to the sluggard, claims consideration for the economy of ants, and alludes to their habit of gathering their food in the harvest—on which account also he elsewhere refers to them as one of the four things which "are little upon the earth but exceeding wise." And again the Augustine poet—using the simile of ants in describing the busy preparations made on the eve of the departure from Carthage—refers to them as ravaging heaps of grain—warned by the approach of coming winter [Virgil *Ænid*, IV., 395-400]. And other so-called "ancients," amongst their fabulous relations concerning these insects, have mentioned similar habits.

This harvesting propensity of ants was for a long time discredited, and those who thought about the subject were content to accept the explanation of Gould [in "Account of English Ants," 1747], viz. :—That these ancient writers had mistaken for seeds and grain the pupæ, which the ants transport from place to place in order to locate them under circumstances best suited for their development; or, again, they would endeavour by learned exposition to derive some meaning from the expressions used—in allusion to this habit—other than afforded in their legitimate interpretation. Moreover, even the authors of that English classic, "An Introduction to Entomology" [Vol. II., pp. 45-46, Ed., 1817], were—commending the explanation of Gould—inclined to doubt the accuracy of the observations which had suggested allusions of the nature of the above, though they were of opinion that such a habit might possibly be found to exist amongst the ants of intertropical countries.

Since the time when these explanations served their purpose, the ways of ants have been, and are, once more carefully considered, with the result of proving that "the parsimonious emmet provident of future" has really an existence in nature. Colonel Sykes† was perhaps the first to demonstrate the fact that these old authorities did not make use of poetic license in their similes and descriptions, by showing that harvesting ants really exist in India. This naturalist observed in June, 1829, ants bringing up to the surface seed from a store which they had accumulated in their subterranean nest, and which they must have gathered in the preceding months of January or February, when the *Panicum*—which was the grass from which the supply had been derived—ripens its seed. He concluded that on this, as on a similar occasion which took place in October of the same year, the seed had got wet during the prevalence of a monsoon, and was brought to the surface in order to dry it. Colonel Sykes, too, was very careful in verifying his facts, as he was aware that they militated against the observations of entomologists in Europe. His observations related to the ant, *Pheidole providens* (Sykes), West.

* This paper was read on 2nd October, 1885, before the Royal Society of Queensland, and already appears in Volume II. (1885) of its Proceedings. As, however, the publication in question has been long since out of print, and interest in the subject of the paper still lives, the re-issue of the latter may appear to be called for. Except for the addition of two footnotes, distinguished by square brackets, the article appears as originally printed.—H.T.

† Trans. Ent. Soc. Vol. I., p. 101. London, 1836.

The Rev. W. Hope,* in 1837, drew attention to the providence of ants, and their habit of hoarding grain as winter store, in order to contrast what had been positively stated on the subject, both by ancients and moderns—including the narrative of Colonel Sykes, with the doubts expressed by the entomologists of his day. He at the same time referred to Bochart [*Hierozoicon*, Vol. III.] for citation of a host of authors all concurring in the same opinion, that certain ants presented this trait.

Mr. T. C. Jerdon incidentally refers to the habit in the above-mentioned Indian ant, and especially dwells on its economic aspect.†

Mr. J. J. Lake describes the depredations of ants upon a pile of unthreshed wheat, lying upon a threshing floor adjoining his house at Zante, and mentions that the seed so carried off was found to be stored up in the nests of these ants.‡

In 1866 M. Lespès wrote in the *Revue des Cours Scientifiques* on the same subject. In the same year also Dr. Gideon Lincecum related§ his observations concerning a Texan ant—“*Myrmica molefaciens*”—which was in the habit of sowing a particular grass, tending the crop, and afterwards reaping the harvest. These interesting particulars had already, in 1862, formed the subject of a communication to Mr. Darwin,|| and they are again repeated, with some omissions, in an interesting popular article—“The Agricultural Ant of Texas”¶ by the same author.

The writer, however, whose published investigations have created the most interest, is Mr. J. Traherne Moggridge, who during a residence at Mentone in the south of Europe, in 1871-72, made the habits of the harvesting ants of that district his special study. Mr. Moggridge first noticed that the ants *Atta structor*, *A. barbara*, and *Pheidole megacephala*, as autumn approaches, were in the habit of storing up the seeds of flowering plants, such as *Polygonum aviculare*, *Capsella bursa-pastoris*, and *Alsine media*, in excavations made by them in the sandstone rocks,** and subsequently was able to confirm his opinion that these ants also made use of stored-up seeds for food.†† The considerable attention which this writer gave to the subject is very evident on a perusal of his popular work on “Harvesting Ants and Trap Door Spiders,” London, 1873. In this publication Mr. Moggridge reviews the Biblical and classical notices of the habit of storing-up grain by ants, and the explanation of the notices given by such entomologists as had considered them worthy of comment. He then mentions the occurrence of this habit in three distinct species of ants found at Mentone, and in six others—natives of other countries; whilst he at the same time dwells on the custom of ants carrying seeds only, but not necessarily, with a view to harvesting them.

He then describes and figures the heaps of rejected portions of seeds found outside the ants' nests, as well as the granaries themselves. Mr. Moggridge observed that seeds whilst in the granaries did not germinate, though they did so when removed by him and afterwards sown; and that when in some exceptional cases the radicle in stored grain did sprout, it was afterwards gnawn off—from which he concluded also that the ants first placed some seeds under circumstances favourable to their germination, and that this process was whilst

* *Vid.* “On Some Doubts Respecting the Economy of Ants.” *Trans. Ent. Soc.*, Vol. II., pp. 211-213. London, 1839.

† “Annals and Magazine of Natural History,” series 2. 1854. Vol. XIII. Independent testimony to the accuracy of some of the observations recorded by Col. Sykes and Mr. Jerdon will be found in “Wanderings of a Naturalist in India,” by A. L. Adams, M.D., pp. 38-39, Edin., 1807. On the economy of this Indian ant, the reader is also referred to the authors quoted by the Rev. W. Hope.

‡ *Athenæum*, No. 1950, March 11, 1865, p. 35.

§ Proceedings of the Academy of Sciences, Philadelphia, 1866, p. 323.

|| *Journ. Lin. Soc.*, London, 1862, pp. 29-31; cf. S. B. Buckley, *P. Ac. Philad.*, 1860 p. 445.

¶ *Hardwicke's Science Gossip*, Jan. 1868, pp. 1-5.

** *Proc. Ent. Soc.*, Lond., 1871, p. 47.

†† *Op cit.*, 1872, p. 8.

in an early stage repressed by the ants themselves.* These facts are interspersed with many relations concerning other peculiar habits of harvesting ants, and ample justice is done to previous writers, whose contributions to the history of the subject are copiously extracted and summarised.

The next writer who treats the subject systematically is Mr. H. Christopher McCook, author of "The Natural History of the Agricultural Ant [*Pogonomyrmex barbatus*] of Texas."† The work is the result of a three weeks' mission to Texas; undertaken by the author for the purpose of testing the accuracy of the above statements made by Dr. Gideon Lincecum. Unfortunately, Mr. McCook's visit was not so well timed as to permit of his being able to gain evidence of these ants actually sowing seed, but he had abundance of evidence that they reaped the harvest—were harvesting ants. This Texan ant differs from all other species possessing this habit, in so much as it clears a large and nearly circular space of ground around its nest, and it is on the outer border of this disc that the ant rice (*Aristida oligantha*), as it is called, grows, entirely freed from weeds. The seeds of this grass are stored up by the ants in their nest amongst other seed; but "that they are regularly sown in autumn" rests on Dr. Lincecum's authority only. Mr. McCook enters even more fully than Mr. Moggridge into the subject of "the ancient belief in harvesting ants; how it was discredited, and how restored." Then, again, Messrs. Treat and Morris, in the *American Entomologist* [*op. cit.* pp. 225-6; 228-9; 264-5] of the same year—namely, 1879—give an interesting account of two other harvesting ants (*Pheidole pennsylvanica* and *P. megacephala*) from New Jersey. Finally, harvesting ants have been alluded to by various popular writers on entomology, though Louis Figuier seems to have passed the subject over, in that form of his interesting work with which English readers are most familiar.

The investigations of these and other authorities have made us acquainted with the existence of this remarkable trait in at least fifteen species of ants. These are natives of Europe,‡ Asia, and America, and the habit is not necessarily restricted to ants of a tropical climate. They all belong to one sub-family of the Formicidæ, namely, the Myrmicidæ—ants endowed with a sting, and which have two joints in the peduncle connecting the thorax with the abdomen; but they are by no means limited to a single genus, or to genera closely allied. The genera including species of harvesting ants are *Atta*, *Myrmica*, *Pheidole*, *Pogonomyrmex*, *Ecodoma*, *Pseudomyrma*, and *Meranoplus*. All of these are, morphologically speaking, very distinct, and do not comprise species alone, in which this habit is manifested.

It will be readily understood then that, in so much as there is no characteristic structural feature by which this class of ants is distinguished, the peculiar habit of harvesting grain is not due to any special organisation, but that it is

* [This gnawing by ants of the radicle of seeds already stored by them is referred to by Bacon, in a work written by him in 1623 (*cf.* De Dignitate et Argumentis Scientiarum, Bk. V., ch. 2). The credit to be the first to allude to this habit is usually (*cf.* Lubbock, "Ants, Bees, and Wasps," p. 61) upon Aldrovandus, whose book on the History of Insects appeared in 1604. The present writer has, however, found a still earlier allusion to the exercise of this remarkable providence on the part of these insects. This is made by Pierius Valerianus, who lived during the time of Leo X. (1475-1523). The account referred to is to be met with in his *Hieroglyphica*, a work of such rarity as to justify the citation of the passage alluded to:—"Mox et providentiam demonstrabant quia memor hyemis cibaria comparat et recondit, et cellas promptuarias facit, femina interim ne nascantur morsu secat, abroque condit, ne rursus in fruges exeant è terra, atque inutilia inde sibi ad usum alimenti fiant, quin etiam si ea imbre madefacta senserit, proferat atque exsiccata, idque es tantum tempore, cum tranquillum atque serenum præsenserit" (*cf.* *Op. cit.* Lib. VIII., Cap. II., p. 89, *ed.* Kirchner, 1678).]

† "The Natural History of the Agricultural Ant of Texas; a Monograph of the habits, architecture, and structure of *Pogonomyrmex barbatus*." [*! M. (Atta) molefaciens.*] London: Trubner and Co., 1879.

‡ We have Sir John Lubbock's authority for the statement that no harvesting ants live in England [British Association for the Advancement of Science, 1878, Section Zoology and Botany]. Mr. J. Curtis, however, states—and he paid much attention to ants and their habits—that *Formica braunea* is one of the species of ants which not unfrequently causes great loss to the farmers by purloining his seed when sown broadcast. [Moreton's Cyclopædia of Agriculture, 1855, p. 918.] That these seeds are also harvested may be regarded as at least very probable.

rather the result of inherited experience—or what used to be called instinct—of the necessity of some such provision by reason of conditions acting from without; and a certain plasticity in the ant organisation is all that need be taken into account in considerations relating to the adaptability of these ants, and this is often very noticeable, to fulfil the rôle which the possession of the peculiar trait has imposed upon them.

Scarcely any record of the occurrence of this habit amongst Australian ants is to be met with, though such a feature could not have escaped the observation of Mr. Damel, who, in the interests of the Godeffroy Museum, gave such assiduous attention to collecting the ants of Australia, and of Queensland in particular.

The first intimation of the existence of harvesting ants in Australia seems to have been made by Mr. W. E. Armit, F.L.S., in the following letter dated from Dunrobin, Georgetown, 19th July, 1878, and addressed to the editor of *Nature*:—

“I have lately discovered a colony of agricultural ants near Georgetown. The species is very small and red. My attention was first directed to these tiny harvesters by noticing heaps of chaff and hulls in a bare spot, situated in a grove of young acacia trees. The formicaries are entirely subterranean, being entered by a funnel-shaped tube. Roads diverge from this gate in four or five directions, and during working hours are alive with what appears like white insects, the little ants being covered by their load. Some of these ants seem to clean the grain, and carry out the husks, which form a heap round the opening to the nests. The clear space round each opening is small, certainly not more than 18 inches in circumference, and a small mound round, not more than 6 inches in height, is formed with the earth excavated in forming the nest. The only species of grain harvested is the seed of *Perotis rara*, which is light when quite ripe. I cannot give the generic name of these little fellows, never having devoted any special study to the family, but shall be happy to furnish specimens in spirits to any naturalist who will forward his address.”*

Still more recently another of our members, Mr. Ling Roth, has written concerning an ant, which Mr. W. F. Kirby refers to as *Meranolopus dimidiatus* (Smith):† “These harvesting ants are found at Mackay, Queensland. They climb up grasses, and carry away the seeds to their nests. The ground near their nests is generally strewn all over with the husks they have brought to the surface.”‡

During last autumn the writer observed on Spring Hill, Brisbane, small ants continually passing to and fro from their nest; some homeward bound heavily laden with the florets of the grass *Eleusine indica*, containing ripe seed, and others setting out for some plants growing a few yards distant, where a further supply could be obtained. The nest to which these seeds were carried, and where they were afterwards harvested, was entirely subterranean, and accessible only by means of a small hole, the neighbourhood of which, to the extent of 2 or 3 inches, was covered with the “chaff” of grass seed, and was constantly receiving additions of the same nature from the small ants, who were busily occupied in carrying these dejecta to the border of the heap, and there without fail depositing them. On opening the nest it was also observed to be plentifully stored with winnowed seed of this same grass, *Eleusine*.

These insects belong to the family Myrmicidæ and to the genus *Pheidole*—ants remarkable as having four different classes of members in their communities, viz.:—The males, the females, the smaller workers (neuters), and the larger workers or soldiers (neuters). The latter class is composed of

* *Nature*, 17th October, 1878, Vol. XIX., p. 643. Since the date of this letter Mr. Armit has left the scene of the operations referred to, and so specimens of the harvesting ants, which there is reason to think will prove different to those subsequently mentioned, have not yet been at the disposal of the writer for examination.

† [The species of the genus named, identified by Professor Aug. Forel from material obtained at Mackay by Gilbert Turner, do not, however, comprise this species. They are *M. hirsutus* Mayr, do. a variety, and *M. pubescens*, Sm., var. *fenestratus*, Sm. (cf. Proc. Lin. Soc. N.S.W. 1897, p. 144).

‡ Journal of the Linnean Society, Vol. XVIII., p. 328. Lond., 1885.

individuals much larger than the workers proper; they have heads also bigger than their bodies, and are provided with powerful jaws. These soldiers are comparatively few in number, and seldom roam many inches from the nest, where they are probably occupied in separating the glumes from the grain, in the grass florets, and other similar labours.

As far as the writer has observed, these ants do not restrict their attention to grass seeds of one kind, neither to this description of seed only. Exceptionally also they carry off other vegetable matter, and sometimes animal matter, perhaps a minute curculio beetle which has been long dead, a portion of another ant, and at another time insect eggs. The latter habit is a little peculiar; the writer could not refer the eggs observed in this situation to any particular insect, and from their shape does not suspect that they were those of aphides; though ants are known to transport the eggs of these plant lice to their nests, and there as foster-parents to tend them until they are hatched, when they can avail themselves of the food supplies to be derived from the resulting animated sugar-pots, whilst these are still under their care. Moreover, those ants which milk aphides are not exclusively confined to this class of food, as may be easily observed. The ants at present under consideration do *par excellence* feed on grass seeds, which they also store up, and in case of partaking of other food, at such times as grass seed cannot be obtained, reject a considerable portion of it around the approaches to their formicary.

This harvesting ant is not uncommon in the neighbourhood of Brisbane, and is very plentiful in the Botanical Gardens, where its nests are usually surrounded by an accumulation of the glumes of *Eragrostis Brownii*. It is to be hoped that it is not responsible for any want of success which may have succeeded sowings of small flower seeds by the gardeners of that establishment; but, though the present writer does not wish to impute any such action to these little emmets, in explanation of a probable occurrence which may be accounted for by other considerations, usually found in the mind of the experienced gardener, he cannot help calling to mind what Mr. Jerdon has written concerning *Pheidole providens* (Sykes), West—the ants that were the subject of his observations. It is as follows:—“They carry off large quantities of seeds of various kinds, especially the small grass seeds, and as every gardener knows to his cost, more especially garden seeds. They will take off cabbage, celery, radish, carrot and tomato seeds, but are particularly partial to light lettuce seeds, and in some gardens, unless the pots in which they are sown be suspended or otherwise protected, the whole of the seeds sown will be removed in one night. I have also had many packets of seeds (especially lettuce) in my room completely emptied before I was aware that the ants had discovered them.”*

As illustrating the wide bearings of the subject of harvesting ants, it may be of interest to remark that Mr. Moggridge approached it not as an entomologist, but as a botanical student. Having casually noticed the habit, he was prompted to make the observations detailed in his work, by the consideration that such habits in ants might be related to the sudden occurrence of plants in certain localities where they had not before been met with, and especially on soil which had been thrown up in digging; the late Mr. Bentham having already, in 1869, directed attention to the little information existing on the origin of plants in such situations.† Nor was Mr. Moggridge led to his investigations, in the first instance, by the purpose of corroborating the testimony of ancient writers; for he only afterwards learnt that European authorities, on the habits of ants, had discredited their statements.

That this Brisbane harvesting ant, also, is an important agent in the local dispersion of plants—especially weeds—and is connected with their sudden

* T. C. Jerdon, An. and Mag. of N.H., Series 2, 1854, Vol. XIII., p. 50.

† On the occasion on which Mr. Bentham directed attention to this state of things he referred to, as a *supposition* only, the statement of Alphonse de Candolle that: “Il faut donc regarder la couche de terre végétale d’un pays comme un magasin de graines au profit des espèces indigènes.”‡ since no direct evidence of the existence of subterranean stores of seeds had been met with, neither by himself nor by anyone whose recorded observation he had seen. Proc. Lin. Soc., Lond. Presidential Address, May, 24th, 1869. § *Geographie Botanique Raisonnée*, p. 625. Paris, 1855.]

appearance on heaps of soil excavated from a depth, is sufficiently demonstrated in the following observations:—The ants of one nest were noticed to be harvesting the seeds of *Portulaca oleracea*, Linn., and of *Amaranthus viridis*, Linn.—both common weeds, and growing at a comparative distance from the nest. These seeds had remained stored up in their nest for some time, when rain suddenly came on, and under its influence the seeds—especially those of the latter plant—commenced to germinate. Of those which had already thrown out a radicle, this was bitten off and brought to the surface; some of these seeds were also gnawn into, and the ruptured black perisperm—containing more or less food substance—in like manner rejected. Other seeds, which had swollen only in response to the moisture, were carried up for the purpose of being dried and re-stored. In the midst of these operations, however, rain came on again, and the ants retired, leaving seeds on the surface. These immediately germinated, and a small patch of *Amaranthus* grew up, marking the site of what was before a nest of harvesting ants, quite isolated amongst plants of different character. On a second occasion a nest, in which much seed of *Eleusine indica* was known to have been harvested some months since, was dug up. Some of the grass seed selected from the nest was afterwards sown; also some of the earth from the nest which was known to contain both seeds of this plant, and of another species of *Amaranthus*. In both cases the sowings were made in situations remote from places in which any of these plants were already growing, and, as a result, in the course of time numerous plants of both *Eleusine indica* and of this second *Amaranthus* sprang up in these new localities, where they continue to flourish.

The genus *Pheidole* to which—as above remarked—the small ant belongs, has representatives throughout the world, and is rather a large one; and though the writer has met with descriptions of, or references to, forty-eight different species, this number will probably be found to fall very short of that of the species which really exist, especially as many members of this genus are, comparatively speaking, diminutive insects or have a very restricted range.* Only six of the forty-eight species are referred to as harvesting ones, viz.:—Two in New Jersey, two in south Europe, one in India, and the present example from Queensland. The habits of the remaining species are very variable, several being found burrowing in rotten wood, and one—*P. javanica*, Mayr—is reported as being restricted to the curious plant *Myrmecodia* (which derives its name from this ant relationship), in which it excavates its galleries.† Two species at least in Queensland are almost entirely nocturnal in their habits, are found in decaying and decayed wood, and probably contribute towards the destruction of forest trees.

The following is a description of the workers of this harvesting ant:—

PHEIDOLE sp. ?

Workers (major).—Length, 5 m.m. (nearly $3\frac{1}{2}$ lines); head and thorax, reddish chestnut brown, front border of head and mandibles almost black, 2nd node of petiole and abdomen very dark brown, legs, yellow-brown; hairy; dull, except abdomen, which is bright; mandibles, striated, with punctures here and there on the entire outer surface, masticatory margin with three very obtuse blunt low teeth; shaft of antennæ not reaching beyond the middle of the length of the head. Head longer than broad, with parallel sides; posterior angles rounded and swollen with a deep longitudinal groove dividing the posterior portion; the whole surface of head densely and finely punctate; covered with wrinkles, which are anteriorly longitudinal, converge as the groove is approached, and are transverse and reticulated on the posterior surface. Clypeus almost smooth, with a rounded emargination on its anterior border.

* [According to Dr. C. G. de Dalla Torre (cf. *Catalogus Hymenopterorum*, vol. 7), the species of *Pheidole*, already described up to 1893, were no less than 140 in number.]

† Mr. H. O. Forbes had painful experience of this fact on his first acquaintance with *Myrmecodia*, the life history of which he has so well illustrated. ["A Naturalist's Wanderings in the Eastern Archipelago," pp. 79-82.]

Frontal laminae short and widely divergent. Thorax densely finely punctate. Pronotum and mesonotum not distinct, forming an elevated disc, with rounded-angular sides and truncated posteriorly, transversely wrinkled, not transversely impressed; metanotum with two sharp teeth, with transverse wrinkles anterior, and densely punctate only between and posterior to them. Petiole densely finely punctate, anterior node compressed, transverse, emarginate above, posterior node not compressed, transverse with a blunt cone on either side. Abdomen smooth, silky, microscopically netted.

Workers (minor).—Length nearly 3 m.m. Reddish-brown, joints of legs and tarsi yellow-brown; dull, except abdomen, which is silky-bright; with erect hairs here and there, most conspicuous on the abdomen, and depressed hairs on antennae and legs. Mandibles, with a few hairs on the outer surface, longitudinally wrinkled at the base. Head closely and finely reticulate-punctate, with longitudinal wrinkles. Clypeus longitudinally wrinkled. Scape scarcely reaching, and not exceeding, posterior margin of head. Thorax closely and finely punctate, without mesothoracic impression, pro- and meso-notum with reticulate wrinkles; a short excrescence sometimes present on the sides of the disc; metanotum with two conspicuous spines. Petiole closely punctate, 1st node emarginate above, 2nd node swollen with pyramidal sides. Abdomen smooth.

Judging only from the description given by Dr. Mayr ["Die Australischen Formiciden," Journ. des Mus. Godf. Heft XII., p. 106, Hamburg, 1876], this species of *Pheidole* seems to most nearly approach his *P. longiceps*. Compared with other examples of the genus found in the vicinity of Brisbane, its colour will at once distinguish it amongst them, as well, perhaps, as the great disparity in the sizes of the two classes of workers, and the excessive development of the head amongst the workers major.

MERANOPLUS.

Recently in an examination of some invertebrates brought by Mr. F. Blackman, from the neighbourhood west of Rockhampton, some ants were noticed belonging to a genus known to include harvesting species, which explained, as was then surmised, and as was afterwards proved, the occurrence also in the collection of a box containing a quantity of the empty glumes of a grass belonging to the genus *Andropogon*.

These ants were much larger than the ones which are above mentioned as occurring at Brisbane, and were only represented in the examples procured by workers of one description, and male insects. Concerning these ants and their habits, and in reply to a series of interrogations, Mr. Blackman informs me to the following effect:—

The ants in question were found at Barwon Park, near Blackwater, and nearly 100 miles to the west of Rockhampton. The soil in which they had elected to place their nest was of that description known as "chocolate soil," a designation which should convey a pretty precise idea of its colour at any rate. This nest was subterranean, and approached by a nearly circular entrance, 3 m.m. in diameter. Its immediate neighbourhood was not conspicuously bare of herbage, but what more especially distinguished the nest was a heap of the hairy husks of some grass, piled loosely around it. Observing this heap, numerous ants were soon noticed coming towards the nest, each heavily laden with a floret of a grass. These florets were found to contain ripe seed, and to be derived from a grass, growing plentifully in the locality, which they seemed to harvest in preference to the seeds of other varieties of grass. The ants carried the florets by fixing their well-developed jaws in the basal portion, and though such loads would seem to impede very much their progression, and though the loose heap of empty husks surrounding the entrance to their nest would appear to impose a formidable obstacle to their gaining it, it was not a

little surprising to witness the adroitness with which they accomplished their object in view, and how skilfully they would manœuvre, and eventually extricate their load from every obstruction with which they came in contact. Whilst these operations were going on ants were ever and anon emerging from their granary, bearing with them husks of the same grass which were empty and deprived of their seeds. These seeds were afterwards found in plenty in the galleries of the nest.

No disparity between the sizes of the ants occupied in the two different operations mentioned was noticed, nor was there anything seen to militate against the conclusion that the same ant which carried a grass-floret into the nest may have also removed the seed whilst below and returned with the empty husk to the surface.

These ants appeared to work slowly and deliberately, with a persistent determination to do their duty, and if molested scarcely quickened their movements, if at all, seldom forsook their charge, and often adopted a squatting attitude,* the very opposite of defiance.

On examination of the material brought by Mr. Blackman from his Barwon Park estate, the writer found (1) a number of reddish-brown very hairy ants, which, from the lateral position of the frontal laminae, belonged to the Cryptoceridæ—a group of the Myrmicidæ. Their antennæ were nine-jointed, including the scape, and this feature, associated with the presence of other characters, would place them in the genus *Meranoplus*† (Smith), as restricted by Mayr.‡ (2.) A quantity of a chocolate-coloured earthy material, containing a number of grass seeds mostly of one kind, though there were amongst them a few smaller rather roundly-ovate seeds. These seeds were carefully examined for evidence of their having been gnawed or otherwise tampered, without any being found; and there was little doubt but that they would grow on being planted. The soil also contained a number of small, shrunken bodies, which, on soaking, were found to be the dried-up hairy larvæ of some insect. (3.) There was also a quantity of the husks of a grass of a single species, *Andropogon intermedia*, with a few glumes derived from another grass, a species of *Pappophorum*, also amongst it.

The genus *Meranoplus*, to which, as above stated, these last harvesting ants belong, is not nearly so rich in species as is *Pheidole*, and only twenty-one§ appear to have been described. Of this number, six are stated to be Australian, five to inhabit the East Indian Archipelago, two India and Ceylon, one South Africa, six South America, whilst the habitat of the remaining one is uncertain.

I do not find any mention of ants belonging to this genus being harvesting species, except such as contained in the short note of Mr. L. Roth, previously cited, relating to the habits of a particular insect which Mr. W. F. Kirby has identified with *M. dimidiatus*, Smith.||

* This is a very common trait in ants. The *Pheidole* above referred to as exhibiting harvesting propensities in the neighbourhood of Brisbane is frequently robbed in returning food-laden to its nest by a species of *Lasius*, when it adopts this attitude. The manner also in which various Queensland ants allow themselves to be borne away unresistingly by their captors is, too, a phase of the same habit.

† F. Smith, "Monograph of the genus *Cryptocerus*," Trans. Ent. Soc., 2nd Series, Vol. II., p. 213, London, 1853.

‡ Dr. Gustav L. Mayr, "Formicidæ," p. 26 (Reise der Novara, Zoologischer Theil. Bd. II. Abth. I., Wien., 1865).

§ This number includes all the species referred to by Mr. F. Smith, who paid special attention to the Cryptoceridæ, under *Meranoplus*. [Vid. Trans. Ent. Soc., Lond., 2nd Series, Vol. II., p. 213; *ib.* 3rd Series, Vol. I., p. 407; *ib.* Vol. V., p. 523; *ib.* 1876, p. 603; and Catalogue of Hym. Ins. in Col. B.M., Pt. VI. Formicidæ, p. 193, 1858.] Dr. Mayr has, however, adverted to Mr. Smith's inaccuracies [*l.c.* Introduction, p. 4, and Journal des Muséum Godeffroy Heft XII., p. 112, Hamburg, 1876], and indicated that some of these twenty-one species should be more correctly included in the typical genus of the family, and not in *Meranoplus*, as not possessing the generic characters really present in the typical species—viz., *M. petiolatus* (Smith) and *M. bicolor* (Guér).

|| "Description of New Species of Cryptoceridæ." Trans. Ent. Soc., Lond. 3rd Series, Vol. V., p. 523.

The present species, as far as the workers are concerned, is one of the largest of the genus, and appears to differ from those hitherto described, amongst which the following definition of its chief characters may serve to distinguish it:—

MEGANOPLUS, sp.

Workers.—Length, 5.5 m.m. Almost uniformly ferruginous, brown, abdomen red-testaceous or sometimes even almost black. Beset with long, thin, outstanding hairs. The whole upper surface, except the abdomen and the posterior portions of clypeus and metanotum and side of thorax, covered with coarse, often reticulated, longitudinal wrinkles. The pro- and meso-notum together form a convex disc, about as broad as long, bounded laterally by overhanging ridges, which are produced anteriorly into blunt teeth, and have tuberosities in the middle of their length. The metanotum descends, and is armed with two posteriorly and outwardly directed sharp spines, from the bases of which ridges extend to the hinder lateral angles, where they form tuberosities. Hinder border with a semi-circular deep emargination, surface between and behind the spines smooth. Nodes of petiole sub-equal, each longitudinally wrinkled, anterior one angular and posterior one rounded above in longitudinal section. Abdomen microscopically punctate, with larger hair-bearing punctations. Head rounded posteriorly at the angles, the margins produced anteriorly into blunt projecting processes. Clypeus sunk into a deep fossulet, having a small anterior mesial elevation, and two prominent teeth on its margin. Mandibles punctate and wrinkled, having four teeth, of which the outermost is largest. Maxillary palp five-jointed, 1, 2, and 3 joints sub-equal, 4 and 5 together scarcely exceeding third. Labial palp 3-jointed, joints sub-equal. Antennæ densely clothed with depressed hairs, scape less than flagellum, with a distal expansion on the side apposed to it. Attennary fossa reaching little beyond eyes. Legs clothed with long ascending hairs.

In size this ant approaches *M. diversus* (Smith), from Champion Bay, with which it agrees in other characters also. The entirely rugose petiole and its larger dimensions, amongst other features, distinguish it from *M. hirsutus*, Mayr, from Gayndah.

Milk Tests at Biggenden Show.

14TH JUNE, 1900.

	Owner.	Name of Cow.	Lb. of Milk.	Per cent. Butter Fat.	Ll. Commercial Butter.
MORNING.	Mr. Fowler	Victoria	18	3.9	786
	Ditto	Darkey	15½	3.8	659
	Ditto	Lady	16	4.4	788
	Ditto	Lassie	11	2.8	344
	Mr. Jones	Louie	15	3.4	571
	Mr. Summers... ..	Primrose	18½	3.4	713
EVENING.	Mr. Fowler	Victoria	14½	3.5	557
	Ditto	Darkey	11½	4.3	540
	Ditto	Lady	11½	4.6	592
	Mr. Jones	Louie	11½	3.8	499
	Mr. Summers	Primrose	11½	7.0	901

TOTALS.

	Victoria.	Darkey.	Lady.	Lassie.	Louie.	Primrose.
Morning	786	659	788	344	571	713
Evening	557	540	592		499	901
	1343	1199	1380	344	1070	1614

NOTE.—The above arrived too late for insertion under the heading "Dairying."—Ed. Q.A.J.