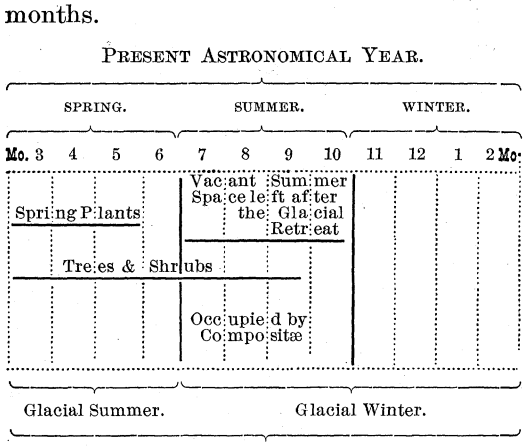
These are the latest group of plants to appear geologically, they grow and flower in the warm season added to the short arctic summer by the retreat of the glacial winter. The following diagram will indicate more clearly what is meant, and will show why it is that the Compositæ of the north temperate zone are the characteristic herbaceous vegetation of the late summer and autumn months.



The land area left bare by the retreat of the glaciers was one of low tension, although by the increase in the length of the summer (some three months) it had a climate in every way suited for the growth of plants. The country to the south was one of very high pressure tension, which must be relieved. The great strain was removed partially by the movement of plants to the northward. "Of all the plants which went south before the first invasion of the glacial ice sheet, none showed greater capacity for variation and improvement than the ancestral forms of the modern dominant family of Compositæ." Such plants in having seeds adapted to fly before the prevalent north winds had reached a low latitude, where great change of form took place owing to the intense struggle for existence. The composite plants were assisted northward by the same structural means as carried them south. Modified considerably into new forms by their migrations and life in the south, they retained their fondness for a warm climate. By the extension of the arctic summer, some three months, they had an opportunity for extensive migration over the country formerly ice bound.

It is thus from the high and low pressures, caused alternately by the glacial epoch, that the distribution of our flora in time has been accomplished.

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On certain habits and instincts of social insects.

If the mere inductive evidence for the Lamarckian theory of the hereditary transmission of acquired characters be strong anywhere, it is assuredly in the region of nervous and mental phenomena. Romanes, whose reserve on the inheritance of acquired characters of a physical nature is everywhere manifest, admits that many instincts are due to the 'lapsing of intelligence.'* "Just as in the lifetime of the individual, adjustive actions which were originally intelligent may by frequent repetitions become automatic, so in the lifetime of the species actions originally intelligent may, by frequent repetitions and heredity, so write their effects on the nervous system that the latter is prepared even before individual experience to perform adjustive actions mechanically which in previous generations were performed intelligently."

Even Weismann, with all his wealth of imagination and capacity for elaboration of details, has nowhere attempted to trace out the mechanism for the evolution of instinct on the line of his 'germ plasm theory,' nor applied to it the manifold combinations of 'biophors' and 'determinants,' 'ids' and 'idauts' which he assumes as the machinery of inheritance. So far the only

* *Mental Evolution in Animals*, p. 178.

key to many instincts is found in the conception that they are inherited habits, themselves the originally conscious reactions of the individual to its surroundings; and this conception has never been seriously attacked from the front in open field. Yet Darwin and all his followers have regarded the habits and instincts of social insects as mainly if not wholly evolved by casual variations and natural selection. For the origin of the instincts and habits of these creatures cannot obviously be explained on Lamarck's principle, since they are for the most part evinced by the workers and soldiers, who are neuters; and such, of course, cannot transmit their instincts by blood to their followers, who are only collaterals and outside the direct line. Here and there, indeed, these neuters may lay eggs, unfertilized but not infertile, since in the bees they produce drones and in some ants also males; but we have no evidence that this occurrence is frequent or regular enough really to influence the race. However, there are two matters, the so-called instincts of neuters generally, and those of slave-makers in particular, that may be dealt with from a point of view which will show that an explanation is available that makes no excessive demand on Lamarckians.

It is a truism to say that one of the most potent factors in education is the imitation of one's peers. As a teacher of experience, I know well how the presence of a few bright and handy students eases my annual task of breaking in a class of book-taught lads to a study requiring handiwork and observation. The nearer akin the model, the more powerful is his example. Thus, the trained elephant is an almost necessary aid to the tamer of wild elephants; no bird-organ can do as well as a good songster; and if we wish to train a daw, magpie or starling to speak, its best teacher is a loquacious parrot.

Animals may readily thus acquire *habits* which, if we did not know their origin, we might well mistake for *instincts*. Thus a dog reared by a she-cat has acquired the habit of sitting up on his tail, licking his paws and washing his face—watching a mouse-hole for hours together; 'and had in short all the ways and manners and disposition of his wet nurse.'* So that in considering the behavior of any species we have to be cautious and bear ever in mind that manifestations which at first sight seem unequivocal instinct may be really habit, and habit only.

Now every neuter insect is born from the pupa (as it was born from the egg) into a community of busy workers of its own kind, practising the art that she† will have to practise in turn. If then her mental powers and emotional development are up to the average of the race there can be no difficulty in her qualifying for the place she will take in the nest. Again we must remember that this neuter insect hatches from the egg into a helpless larva, to be fed and tended with most devoted care by the adult sister workers until it passes into the chrysalis or pupa stage, where it sleeps out the transformations that make it an adult. We know well that neuter insects show every sign of varied emotion; everyone can tell the difference of demeanor between the busy bee and the angry one; and observers have shown us ample evidence of many other emotions. If then memory of the earlier larval state survives the pupa trance‡ our

*See Romanes, op. cit., p. 226.

† The so-called neuter is always an imperfect female.

‡ Lubbock has shown that ants will tend any young whatever of their own species even if born in other nests; but none the less they do reject them as strangers after they have passed through pupadom into the adult state, while they welcome back the offspring of their own nest that have been fostered by strangers. The converse experiments have not been tried, to ascertain whether the new-born adults that have been nursed outside their own nest show any memory of or preference for their own folk or their fosterers respectively. (See Lubbock, 'Ants, Bees and Wasps.')

newly emerged neuter should revive with the liveliest gratitude and almost filial affection for its mates, who have tended it as devotedly as elder sisters in charge of a family do even among ourselves.

The only possible objections to this view are, first, that the insects have not intelligence enough for imitation, and secondly, that teaching presupposes communication between the teacher and the taught, which we have no right to assume. But these objections fall as baseless when we observe for ourselves, or trace with a Huber, a Forel, a Lubbock, or a Bate the unmistakable intelligence and the unequivocal signs of communication to be found among these animals.

We may still assign to natural selection a certain part, much more limited than has hitherto been supposed. It conserves the general intelligence of the race at a high pitch, by constantly weeding families prolific of foolish virgins; and it checks all excessive development of individuality by destroying families with an undue proportion of those geniuses who aim at striking out new paths for themselves instead of devotedly working at their settled coöperative tasks. But the singular mixture of ability and routine displayed by ants and bees is just what we should expect if their arts were largely attained by the influence of strong tradition. Our lawyers till quite recently showed the severe limitations imposed by tradition on intelligence. And this is my case for regarding the ways of neuter insects as habits and practices, not instincts. Many ants make slaves; they raid the nest of other species, killing the adults and bringing home the helpless young. These are nursed by workers of the same slave race that were once themselves brought in the immature state to the nest. Some of these slave makers can neither clean themselves nor feed themselves; everything has to be done for them by their slaves, save the work of war and capture.

Lubbock writes: "They have lost the greater part of their instincts; their art, that is, the power of building; their domestic habits, for they show no care for their own young, all this being done by the slaves; their industry—they take no part in providing the daily supplies if the colony changes the situation of its nest, the masters are all carried by the slaves on their backs to the new one; nay, they have even lost the habit of feeding . . . However small the prison, however large the quantity of food, these stupid creatures will starve in the midst of plenty rather than feed themselves."

The origin of this character is not far to seek; the fertile insects, *i. e.*, the males and perfect females of social insects, contribute little or nothing to the work of their nest save their offspring*; hence in the parents of each generation there is a constant fostering of selfishness and dependence to be transmitted to their offspring.

The female or queen termite (or White ant), indeed, is guarded from all exertion and tended in a way to satisfy the indolence of the most languid creole fine lady; the only drawbacks of her position being lack of amusements and of lovers on the one hand and an excessive fertility on the other. Where all or many of the neuters are workers, indolence and selfishness are checked and natural selection constantly eliminates those families whose altruism is insufficient for a social life. But if once circumstances arrive in which slaves are present to do the duties, it is easy to see how all the traditions of work or self help—save in war—can die out and be utterly lost, bravery, pugnacity and honorable coöperation being the sole virtues to survive. It seems at first sight strange

*The amount done is perhaps greatest among Wasps and Humble Bees, least among Termites.

that the slave holders have lost the power of feeding themselves; but this is not unexampled in human affairs. Surely many a fine lady might starve outright in a place with no provender but live fowls and unthreshed wheat and water, no utensils but dry sticks and a few stones. Yet we know that savages of far lower wit could kill and pluck the fowls and get fire, spit and roast them, crush the wheat between the stones and make a damper cook it in the embers. This is a case of the loss of the power of self help by peculiar education, and if we admit this explanation for the fine lady we have no right to reject it for the slave holding ant.

I am aware that I have not dealt exhaustively with the whole question of social insects. There are lots of cruxes in their manners and customs, and especially in the manifold forms that occur in one and the same species. Why, for instance, worse food and a narrower cell should make a fertilized bee's egg become a sterile worker instead of a queen, no one knows; and the problems presented among ants are far more difficult and complicated. But it is as well to take stock frequently of our speculations, and to place our certain realized assets to the credit side, even though we have to keep most of our accounts open indefinitely.

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THE PROPER SCIENTIFIC NAME FOR BREWER'S MOLE.

THERE are three species of moles in the Eastern States, the Star-nosed mole, *Condylura cristata*, the common or Shrew mole, *Scalops aquaticus*, and a third less familiar species known as Brewer's mole, or the Hairy-tailed mole. It is to this last species that my remarks relate. It was described by Bachman in 1842 in the *Boston Journal of Natural History* (vol. 4, page 32) under the name of *Scalops breweri*, and was cited under that designation until 1879, when Dr. Coues proposed to change the specific name to *americanus*. This proposition was based on the fact that in Harlan's *Fauna Americana*, published in 1825, the name '*Talpa americana*, black mole, Bartram's manuscript notes,' occurs in synonymy at the head of a description which Dr. Coues thought might be in part, at least, applicable to the species under consideration.

I find, however, that this is a literal translation of Desmarest's description of the European mole, *Talpa europæa*, with no additions whatever, and no other alteration than the omission of a word or sentence here and there. It is evident, therefore, that Harlan included nothing from Bartram's manuscript, whatever it may have contained, and that the name *Talpa americana* has no validity.

It will be necessary to return to the specific name *breweri*. I recently separated Brewer's mole as the representative of a distinct genus, which I called *Parascalops*. If this distinction be accepted, the proper name of the species will be *Parascalops breweri* (Bachman).

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THE AMERICAN FOLK-LORE SOCIETY.

THE annual meeting of the Society was held at the Columbian University, Washington, December 27th and 28th. Owing to a death in his family, the President, Dr. Alcee Fortier, of Louisiana, was prevented from attending.

The Secretary, Mr. W. W. Newell, submitted a report in which he detailed the publications of the Society for the year. These included two volumes of 'Folk Tales of Angola,' prepared by Heli Chatelain, late United States commercial agent at Loanda, West Africa, and papers by various well-known authors as follows: 'Notes on the folk-lore of the mountain whites of the Alleghanies,' J. Hampton Porter; 'Three