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“The whitlow of the third species is very difficult to cure: the horn must be cut, and the flesh taken off also; and the carious bone must be then scraped, and seared with a red-hot iron.”

The manner of operating with the knife, in order to discover the seat of the disease, is extremely well described in the above memoir. The analogy between the treatment of the whitlow in human creatures and that in animals, shows how efficacious the immersion in hot water is as recommended by the author; and the careful cleaning of the ulcers, upon which he insists, is extremely important. I entreat that some intelligent agriculturists may communicate to the public their observations from time to time on this disease, and the best methods of cure.

XXXVI. *On two Species of the Sphex or Wasp, found in Virginia and Pennsylvania, and probably existing through all the United States.* By H. LATROBE, Esq.

THE two species of sphex whose astonishing industry presents such interesting particulars, are known in America by the names of the *blue wasp*, the *mason* and the *dirt-dauber*. These wasps are distinguished among all the remarkable insects which belong to the order of the *hymenopteræ* of Linnaeus, by the singular and cruel manner in which they provide for their young.

The two species of sphex now mentioned are distinguished from each other by their manner of building, and by the form of their bodies; but they are quite similar in their manners, in the materials they employ in making their cells, and in the food they prepare for their progeny.

The first is probably the *sphex cærulea alis fuscis* of Linnaeus*. It is by far the most common: its feelers are sharp-pointed, and are extended when the insect is at work; on its snout it carries a strong beak, with which it works sideways, by making furrows on the surface of its little

* The blue ichneumon wasp, with gilt wings. (De Geer.)

cells,

cells, which appear as if channelled ; its thorax is thick, and the abdomen is attached to it by a kind of slender stalk like the petiole of a flower. To this petiole belongs a scutum from which issues a strong hook, very useful to the animal in securing its prey. The sting is not very painful, and the pain of short duration. The wings, (which Linnæus describes as being brown,) besides being of a fine green, are also blue and brown. The joints of the feet are yellow, and the whole head, body and legs are of a blue colour. The writer of this article has seen some individuals which had yellow spots upon the thorax at the root of the wings.

The other wasp * (*sphex nigra*, *abdomine petiolato atro*, *alis subviolaceis*, of Linnæus,) has a large head, a flat and open nose ; the thorax longer in proportion, the petiole of the abdomen very long, it has no hook ; the abdomen is conical and of an elegant form. Its colour in general is a deep blue approaching to black, but there are plenty of yellow spots upon the thorax ; the thighs, legs, and feet are also spotted with yellow. Its feelers are longer than those of the preceding one ; it carries them vertically, and crooks them often.

The cells of both species are built of clay, which the insect collects in moist places ; but the appearance and construction of these cells are different for each species.

The blue sphex chooses in the open air the south front of a rock, or trunk of a tree, for its residence. It then seeks its building materials on the bank of some rivulet : it collects the clay with its feet ; and after having made as large a ball as it can carry, it begins by laying a slender coating upon the wood or stone. It spreads the clay with its head, and a sharp sound is heard while it is at work. It then flies off for another load, and soon forms the upper extremity of its cell. It then goes on to a second range, working alternately on both sides, and often visiting the interior of the tube, which it renders perfectly close and compact. It thus forms a funnel three or four inches long before attempting to lay up any provisions for its young.

* Ichneumon wasp of Pennsylvania. (De Geer.)

In the inside of a house the wasp finds no place so convenient to build its nest as the back of a picture, because it prefers establishing itself in places where there is not too much light; and the back of a picture has also the advantage of furnishing two walls to its cell. The hollow mouldings in a pannel retain it strongly, as well as the interior angles of a table. In the wooden houses of Virginia, such places swarm with their nests.

I have seen the empty space between the top of the books and the upper shelf of a bookcase occupied by a whole family of these wasps, which had saved themselves a great deal of trouble in this instance, as they had only to build one division in their nests.

The nests of the Pennsylvanian wasps differ essentially from those of the *sphex caerulea*. In place of long tubes divided into distinct cells, the former construct horizontal chambers contiguous to each other. They are completely polished within, but are more coarsely wrought without.

Both species of these insects, however, prepare the same kind of food for their young; that is to say, spiders of every kind, but especially those which do not secure themselves by very extensive webs. It is a kind of yellow spider which the wasp collects in greatest quantities. The author, however, has seen both species attack very large spiders in the middle of their webs, and surrounded with the carcasses of the insects they had devoured; he has even seen one of these wasps dart quickly upon the spider and wound it with its sting. The wasp then retired to clean itself from some fibres of the web; which it did like the common fly, by brushing its wings and head with its legs. After having been attacked several times, the spider tried to effect its escape by dropping quickly down by means of its thread to the floor, when it began to run off; but its antagonist continued to sting it, and even attempted to carry it off: the spider was, however, too large and heavy; and although the wasp tried to lighten the weight by cutting off the spider's legs, it did not succeed in carrying off its booty for a whole hour, during which time the author was watching.

The

The insect does not kill the spiders which it collects in this manner, but leaves enough of life in them to prevent them from putrefaction or from drying up. In all the cells that I opened, I found the spiders in a state of languor, which admitted of their moving their limbs without changing their places. We can conceive nothing more painful than their situation : they are huddled together for the purpose of being devoured piecemeal by the young wasps, for whose food they are destined.

Each of the cellules of the Pennsylvanian wasp, being intended to contain a certain number of spiders, is separately constructed ; but the *sphex cærulea*, which builds a long tube, gathers as many spiders as it thinks necessary ; and, after having laid an egg, encloses it along with the spiders by means of a transverse division of clay. It lays another egg in the following cellule, which it fills and shuts up in the same manner, and so on with four or five cellules in the same tube.

The egg is not long of hatching after being closed up ; but the author was not able to ascertain the time required for the formation of the young wasp. There are drawings coloured after nature published with the memoir, giving sections of the cells of these wasps, and showing the different periods of the transformation of the insects.

As I always found an unequal number of spiders in various cells, but apparently proportioned to their capacity, I opened a range of the cells of the Pennsylvanian wasp ; and having weighed separately the contents of each, I obtained the following results :

	Grains.
In the first cellule the spiders weighed	7½
In the second, there were 17 spiders and an empty skin ; the worm weighed ¼ grain, and the spiders	6½
The third contained 19 very small spiders and some empty skins ; the whole weighed	5¾
The worm weighed	1½
The fourth contained only carcasses of spiders, the worm was weak and feeble. I presume that it had too little nourishment, or that it was sick ; it weighed	3¼
	The

The fifth contained an envelop in which was a large worm not yet in the state of a chrysalis; the whole weighed - - - - - 3½ Grains.

The sixth and seventh cellules were empty; the young wasp had abandoned them.

This examination proves that the wasp distributes with much judgment the quantity of food necessary for its progeny; in most of the cellules, for instance, I ought to have found twenty-two or twenty-three spiders, and yet sometimes there are only five or six, but in this case they are very large ones. It appears also, that when the worm has attained its greatest size, its weight is only one half of that of the food it has consumed.

If it should become necessary to break through the barrier antiently traced between reason and instinct, the œconomy of the whole class of *hymenopteræ*, and particularly of the wasps, may contribute to it. I shall relate a singular example which appears to be above mere instinct.

For the purpose of inspecting one of these insects (the Pennsylvanian wasp) while at work, I was obliged to remove a small distance from the wall a picture behind which the nest was placed. In doing so I deranged several cellules, because the earthy mastic which joined them to the wall was broken in several places and exposed the spiders and the young worms to view.

I held the frame about an inch from the wall in order to see what passed behind. In a short time the wasp arrived, loaded with a round lump of clay. It came merely for the purpose of making a new cellule; but seeing that its former works were deranged, it began to run rapidly over the cellules, apparently hesitating what to do. At last it deposited the clay upon the edge of one of the apertures, and began to spread it with its snout, pushing it before it, in the attitude of a sow digging in the ground. It emitted a shrill buzzing when at work. After having very properly replastered the work, it flew away. In four minutes it returned with a new load of clay, which it deposited in the next aperture. It repeated its visits four times; and after having finished the repairs and being convinced of the goodness

goodness of the workmanship by running over it several times, it flew off again and returned with a new load, with which it began to form a new cell.

If the faculty of modifying the conduct of an individual according to circumstances is one of the characteristics of reason, the fact I have now mentioned is surely a proof of reasoning in an insect. The wasp had remarked the unexpected derangement which had been made during its absence; the clay which it brought was intended for a new cellule; but observing the mischief done to the old ones, it repaired them before building any more.

XXXVII. *Description and Manner of using M. MONTGOLFIER's Calorimeter, an Apparatus for determining the comparative Quantities of Heat furnished by various Descriptions of Combustibles* *.

THE proper application of combustibles is one of the most important objects in all the processes of the arts, more particularly in chemical operations; it is equally useful to ascertain what advantage in point of œconomy results from the employment of this or that kind of fuel, and to determine the force of the caloric disengaged from the substances which we burn.

Equal quantities of different kinds of combustibles do not always yield the same degree of heat; and it requires a longer space of time to disengage a given quantity of caloric from some combustibles than from others. The success of an operation very often depends upon the promptitude with which it is executed. Manufacturers, distillers, and agriculturists ought consequently to attach a great deal of importance to the knowledge of the most œconomical fuel, or what are the effects which result from a given quantity of any particular kind; in short, it ought to be distinctly ascertained what is the most certain and the easiest method of determining the difference of the action of caloric.

* From *Journal des Mines*, vol. xviii.