RESEARCHES

IN

NATURAL HISTORY.

Second Edition.

—— Equidem credo, quia sit divinitus illis
Ingenium. VIRG.

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essentials to revival from torpidity. The toad and the lizard found sealed up in rocks, and the repose of seeds under ground for a long extended period, are merely an extension of the same principle, displayed at regular intervals every year, in the sleep of the tortoise, hedgehog, dormouse, marmot, and others, or in the insect and reptile world; or the repose of vegetation in the bud. The *erinaceus europeus*, or hedgehog, wraps itself up most curiously in a ball of hay, with which it may be supplied; the intertexture of the fibres is remarkably close, and the exterior surface quite smooth. We once had a tame hedgehog, and its habits a good deal resembled those of our dormice: it took its food always by night.

Dr. Reeve, in his "Essay on the Torpidity of Animals," has classed the phenomena of torpidity under the following heads: —

I. The temperature of hybernating animals is diminished.

II. The circulation of the blood becomes slower.

III. The respiration is less frequent, and sometimes entirely suspended.

IV. The action of the stomach and digestive organs is suspended.

V. The irritability and sensibility of the muscular and nervous powers are diminished and suspended.

On each of these a few remarks will be made, to preserve a somewhat arranged form: the causes of torpidity may also be glanced at, and general deductions made.

I. Mr. Hunter ascertained that the temperature of a hedgehog, at the diaphragm, in summer, was 97° Fahrenheit, when the thermometer in the shade was 78°; when the air was 44°, the animal became torpid,

and its temperature 48°.5 F.; and the air being 26°, the temperature of the animal was 30° F. Pallas, in the case of a torpid hedgehog, found the skin under the belly 39°.5, and Spallanzani limits the decrease of temperature during torpidity to 36° F. The temperature of our dormice was 102° to 104° F.; Dr. Reeve found it 101°. The animal in a semi-torpid state, in our experiments, was at one time 62°.5, and at another 69° F. Dr. Reeve found the skin of the dormouse, when rolled up and torpid in winter, 43°, 39°, and even 35°, on the exterior surface, but in the stomach 67° and 73°—an approximation to our results: marmots have a temperature amounting to 101° and 102°, and this sinks in the torpid state even as low as 43°. The *arctomys marmota*, the marmot of the Alps, is that best known. Three new species, however, from the arctic regions, are described in the Linnean Transactions. * The arctomys hoodii, is a beautiful little animal, and received its specific name after that of Lieut. Hood, one of the party under the command of Capt. Franklin, in the overland expedition. The marmots of North America feed on vegetables, fruits, and roots; live under ground, and in the cavities of trees; and, like the alpine marmot, are said to be torpid during winter. For a description of the alpine marmot, we must refer to our little work on Switzerland †, p. 25, &c. It would appear that, though the exterior surface of the animal be of a similar temperature with the ambient medium, the internal temperature is higher. Spallanzani found the wood-mouse (which in Italy becomes torpid in November) in a torpid state, when the air in its cage was 43°, and the

* Vol. xiii. Lond. 1822. 4to. p. 579, &c.

† "A Glance at some of the Beauties and Sublimities of Switzerland." London. 1829.

temperature of the skin 45°. It seems, therefore, clearly demonstrated, that in torpidity the temperature of the body is reduced.

II. In the case of the *mus cricetus*, when active and irritated, its heart beats 150 strokes in a minute; while in a torpid state the number of pulsations are reduced to 15. In the *bat*, the number of beats may be stated at 100, but when torpid these amount to only about 14. Dormice have a very rapid pulse; but when semi-torpid, the number of beats may be considered about 31. The action of the heart ultimately becomes imperceptible, and before this period the pulsations do not exceed 16. It is not probable, that though the circulation be reduced to its lowest pulse, and the diastole and systole become inappreciable, that the blood ever congeals, though it may become more dense. Spallanzani informs us, that if the abstracted blood of the marmot be subjected to a temperature even higher than that of the lungs of the animal, it is frozen, but is never found congealed in their torpid state, even after exposure to a cold several degrees below the zero of Fahrenheit: so true is it, that "in the blood is the life thereof." These facts show plainly, that though the circulation be in a state of torpidity, and reduced to its minimum, that agency, *superadded* to their material organisation, which we call *the principle of life*, preserves the circulating fluid in a liquid form.

III. By the experiments of Spallanzani, torpid bats lived seven minutes in the exhausted receiver of an air-pump, in which another bat perished in less than one half this period. Some animals will support such an attenuated medium for a long period: we found this in experiments with the *grasshopper:* the respiration seemed hurried and laborious, but it was not in-