giorna), I call attention to this anatomical peculiarity, of which he has given a detailed description in a memoir published in conjunction with M. L. de Sanctis.

On examining at the bottom of the mouth the pharyngeal apertures of the branchial chambers, or separating the walls of their external apertures, we see, in front of each of the respiratory surfaces, a very regular series of organs which do not occur in any other fish, whether bony or cartilaginous. I have ascertained that they are wanting in two species belonging to genera nearly allied to *Cephaloptera* (namely *Rhinoptera marginalis* and *Ætobatis narinari*). Thus their presence appears to me, as to M. Panceri, to constitute one of the essential characters of the genus *Cephaloptera*.

These organs are elongated lamellæ, the aspect of which somewhat reminds us of that of the stems of ferns, but with the leaflets turned back towards the branchiæ. Each being formed of a fold of mucous membrane supported by a cartilage, these lamellæ are attached to the anterior surface of the branchial arches, in front of the membranous and vascular folds of the respiratory organs; and it is their position that has suggested the name of *prebranchial appendages*, by which they are designated by the Italian anatomist.

They do not serve for respiration. By means of injections, M. Panceri has ascertained that they receive arterial vessels, like the other organs, and not branches of the branchial artery. According to him, they are destined, on account of the remarkable size of the apertures of the branchial chambers, the orifices of which are much smaller in the other Rays, to retain the water and prevent it from traversing these cavities with a rapidity which would be injurious to the perfect accomplishment of the act of hæmatosis.—*Comptes Rendus*, March 7, 1870, tome lxx. pp. 491, 492.

Observations on the Turning of Fungi.

By M. P. DUCHARTRE.

The author remarks that whilst the researches of modern botanists have accounted for a great number of the vital phenomena of plants, there are still some whose causes remain in obscurity, although the phenomena themselves may be manifested daily to observation. Among these are the phenomena of direction, the tendencies of certain organs to hold themselves always in a particular position, and to return to that position when designedly displaced from it. The favourite hypotheses upon this subject, especially in Germany, tend to give the phenomena a purely mechanical character; but the author contends that such generalizations have been made too hastily, and cites the following curious instance of the growth of a fungus under very peculiar circumstances in support of his opinion.

In a garden at Meudon (Seine-et-Oise) a cask had been placed to serve as a reservoir for watering the garden; it was a cask of 225 litres, having its bottom covered with a thick layer of plaster; it

was placed on end, with its lower part sunk about 25 centimetres below the level of the soil, within a sort of tub large enough to leave between the two an annular space open above and 6 or 7 centimetres in width. The plastered bottom of this cask was bordered all round to a height of 8 centimetres, so that a vacant space of the same height was left beneath it. The cask was kept always full of water, and completely exposed to the sun during the long summer days; so that the atmosphere contained in the vacant space beneath it must have been at once hot, moist, and dark; and the layer of plaster itself was a soil placed under favourable conditions in some respects.

At the end of September 1869, the author found upon the lower surface of this layer of plaster more than 500 individuals of a small Agaric belonging to the genus *Coprinus*. They were at various stages of development, about half of them being already mature; these were from 3 to 4 centimetres in height, with a slender cylindrical stem and a moderately convex, delicate hood, varying in diameter from 12 to 15 millims. Their colour was pale, slightly tawny, but the hymenial lamellæ were of a brownish violet tint. The author believes the species to be *Agaricus (Coprinus) radians*, Desmaz.

The entire group of Agarics occupied about a quarter of the whole circular layer of plaster, the remaining three-quarters being destitute of them. They were all towards the southern part. Springing from the roof of the cavity under the cask, they had grown from above downwards, or in a direction opposite to their natural one; but their stems departed from the vertical by at least 30° , *their direction being towards the north*. Upon this fact the author remarks that it is in opposition to the hypothesis, particularly maintained by Hofmeister and J. Sachs, that the action of gravity has much to do with the direction of the organs of plants: if the little Agarics had yielded to the action of gravity, they would have followed the vertical line, from which they all departed.

The author also calls attention to the difficulty of understanding the cause of the deviation *towards the north*. The Fungi generally bend towards the light, like Phanerogamous plants; and the author records an experiment made by him with *Claviceps purpurea* growing on ergotized wheat, which constantly turned its stem at an angle of about 45° , in order to direct its head towards the light; so that, when it had been moved two or three times, its stem had become entirely sinuous. But this motion could not have influenced the fungi noticed by the author, as no light could penetrate the space in which they grew; and, moreover, they had directed themselves from the south or sunny side towards the obscurity of the north. Their stems, also, were quite rectilinear.

The most remarkable fact noticed by the author is the following. From the exceptional position in which these fungi were developed, their direction was, of course, reversed, and the hoods had their free and naked surface, which is usually superior, turned towards the ground, whilst their hymenial surface, with its lamellæ, was turned

upwards. This reversed position was maintained throughout the young state of the plants so long as the hood, then in the form of a thimble, had its hymenial lamellæ closely applied to the upper part of the stem; but as soon as the hood began to spread out and remove its lamellæ from contact with the stem, the latter bent upwards at a distance of about five millims. from its extremity, in such a manner as to elevate the hood and turn the lamellæ downwards. This bending was not a gradual curvature, but an actual elbow, forming a right (or even a slightly acute) angle, having for its sides the two very unequal portions of the stem, both of which were rectilinear. This turning had taken place upon all the individuals, about fifty in number, which had attained the adult state. The author confesses himself unable to suggest any satisfactory explanation of it. It is evident that the erection of the apex of the stem, which turned the hood over, must have been produced by the sudden elongation of the cellular tissue on one side of the stem to a much greater extent than that on the opposite side; but, as the author remarks, this is merely stating the crude fact, not explaining it. He says that if we chose "to employ a word now much in vogue," we might say that the portion of tissue which was active in this erection acquired at the proper moment a *tension* superior to the tissue occupying the opposite side. But this would be merely to substitute a word having a scientific appearance for more commonplace expressions, and it would still remain to be explained how this unilateral excess of elongation, or this "local tension," could have been produced in an organ in which nothing was predisposed for it, and simply because the exceptional position of the fungus had reversed the natural direction of its organs. That this change of direction is not isolated or accidental, has been proved by the author by experiments on some plants of *Claviceps purpurea* grown in a reversed position, which, on approaching maturity, turned up their stalks by describing a curve forming a larger or smaller portion of a circle, after which the extremities bearing the heads continued to grow upwards. This fact, the author thinks, is still more unfavourable to the theory of the influence of gravity upon the direction of growth of Fungi than even the phenomena observed by him in the Agaric; for the *Claviceps* has no hymenial lamellæ to exhibit the hypothetical tendency to yielding to the action of gravity, its head being nearly globular and symmetrical in all its parts.—*Comptes Rendus*, April 11, 1870, tome lxx. pp. 776–782.

Deep-sea Dredging in the Adriatic.

We understand that Prof. Oscar Schmidt of Gratz will publish in June an account of the Sponges of the Atlantic, founded chiefly on the collections made by Mr. Pourtales and the Scandinavian zoologists, and that he will proceed this summer to various parts of the Adriatic to make deep-sea dredgings, in the steamer 'Triest,' of the Imperial Austrian navy.—J. E. GRAY.

Duchartre, Pierre Etienne Simon. 1870. "Observations on the turning of fungi." *The Annals and magazine of natural history; zoology, botany, and geology* 5, 386–388. <https://doi.org/10.1080/00222937008696181>.

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