

nasal bones; the teeth, implanted in distinct sockets, have sub-compressed, recurved, conical, pointed crowns, with minutely crenulated borders. The foremost tooth in the maxillary is a canine; and in other points the dentition shows Theriodont characters. This fossil has been described by Dr. Leidy under the name of *Bathynathus borealis*. Thus, supposing the affinities of the fossils from the Oural and Prince-Edward Island to be correctly determined, the Reptilia distinguished by Mammalian characters are shown to have had a very wide range. Further, the author thinks that the Theriodont Reptiles of the Bristol Dolomitic Conglomerate may also prove to constitute a family in the Theriodont order.

MISCELLANEOUS.

Parkeria inferred to have been a Species of Hydractinia.

By H. J. CARTER, F.R.S. &c.

To the Editors of the Annals and Magazine of Natural History.

GENTLEMEN,—Having lately received, again through the kindness of my friend Mr. W. J. Sollas, several specimens of *Parkeria* from the Cambridge Greensand, my attention has been directed to their structure, which so closely resembles that of the Hydractiniidæ that a parity of organization between the two may be fairly inferred, the particulars of which I hope to communicate to you on a future occasion.

I am, Gentlemen,

Yours faithfully,

London,
July 20, 1876.

HENRY J. CARTER.

On Saccharomyces cerevisiæ. By MM. FRANCISCO QUIROGA Y RODRIGUEZ and ENRIQUE SERRANO Y FASTIGATI.

The resumption of our experimental researches upon the influence exerted by various agents and the combination of different conditions upon the various inferior organisms has led us to the study of these influences upon beer-yeast. Our observations were made with the same Verick microscope which we used in our investigations of blood, and giving an amplification of 780 diameters. The number of observations and measurements has been 465, made upon 126 different preparations.

The results obtained are as follows:—

1. In all the preparations made, at the end of five or six days, with the *Saccharomyces* placed in distilled water and exposed freely to the air, light, and surrounding temperature, or in solutions of various phosphates and chloride of ammonium, or placed under the same conditions as the preceding after desiccation, we have observed an infinite number of more or less spherical yellowish corpuscles, in no case exceeding in diameter the thousandth of a millimetre,

which float among the normal cells of the yeast, unite sometimes, and appear also to be enveloped by a membrane. These granules resemble in appearance the masses into which we find the cell-contents divided in some cells; and we think we may affirm that their number is greater in the preparations in which we observe several cells which have folds or are ruptured, than in those which do not present this condition.

2. We have always observed in the vacuoles of the cells one or two shining corpuscles, of a more or less deep yellow colour, and endowed with an oscillatory movement. These corpuscles resemble at the same time the other granules which, as already stated, float freely in the exterior liquid and the protoplasmic granules which occur in the cells outside the vacuoles.

3. In yeast placed in water we have observed at the end of five days cells folded in various fashions—some with the folds normal to the larger axis of the ellipse, others forming acute angles and in a direction divergent from the centre to the periphery. Some cells were constricted in a singular manner, forming a hood and resembling in appearance those blood-globules which were formerly supposed to have an aperture.

4. The action of heat causes the inflation of the cells even to the rupture of some of them, the contents of which escape divided into several parts, filling the field of the microscope with granules. At the first moment of this action the volume of the vacuoles increases by the union into a single one of the two or more that may be contained in the primitive cell. We have also observed some cells in which the torn edges of the enveloping membrane might be very clearly seen.

5. When the preparations of *Saccharomyces cerevisiæ* are treated with concentrated sulphuric acid, we observe, leaving out of consideration the rupture and natural destruction which is produced in most of the cells, that the vacuoles swell very rapidly, the cells acquire a homogeneous appearance and become diaphanous, also becoming nearly spherical, and there is a production of gas.

When this action is completed, at the end of twenty-four hours, the cell consists of a portion of cell-contents contracted into a yellow, homogeneous mass of almost spherical form, of an enveloping membrane, which is more distinctly marked than before, and of an annular space, which is observed between the latter and the yellowish mass, and which has not the appearance of the vacuoles, nor that of the homogeneous or granulated substances which fill the other cells.

6. With phenol in fusion we see the cell-contents acquire sometimes a homogeneous appearance, sometimes that of a mass with a few small granules. In all the cells we find a double contour, which is due to the condensation of the phenol around the enveloping membrane. The cells have a tendency to become spherical or nearly so.

7. *Saccharomyces* deprived of light presents the most remarkable alterations. It is this that we have most carefully studied; and the results obtained seem to us to merit most confidence.

The preparations were made, first of all, after the fungus had remained for twelve days in darkness; and we shall describe in order what is to be seen in the superior pellicle, what occurs in the intermediate liquid, and what we have observed in the deposit at the bottom.

A. The pellicle of the surface consists of a multitude of cells of very small size, of an elliptical form more elongated than that of the normal cells, and more resembling a small cylinder furnished at the ends with two spherical caps. In many of them we find one or two vacuoles; and in others the interior mass presents a homogeneity giving it the appearance of a large vacuole filling almost the whole space, leaving the protoplasm reduced to a mere ring bordering the periphery. Many of these cells occur anastomosed, with their longer axes continuous. In various parts of the field of the microscope we also observe elongated filaments very similar to the parasites which have been discovered by M. Pasteur in certain sick wines. The yellowish granules already mentioned are entirely wanting in these preparations of the superficial pellicle.

In most of these same preparations we have been able to observe the following order of appearances:—

a. Cells with vacuoles, very little elongated—between 3.2 and $4.8\ \mu$ in length, and from 1.6 – $3.2\ \mu$ in breadth, the normal cells having dimensions varying between 6.4 by $4.8\ \mu$ and 8 by $6.4\ \mu$; they are in other respects similar to those of yeast.

b. Cells which unite in the direction of their longer axes.

c. Cells a little more elongated and of the same width as the above, with a vacuole filling the whole of their interior and giving it an appearance of homogeneity.

d. Cells arising from the union of two others in the manner above described, but in which the wall of separation is still visible.

e. Cells which, by their length, seem to originate from the union of two, three, or more, in the direction of their longer axes, and in which septa have disappeared.

f. Very long filaments, $33.6\ \mu$ – $46.4\ \mu$ in length, and $1.6\ \mu$ in breadth, with the appearances that have been already described.

B. In the preparations made with the liquid that exists between the superficial pellicle and the mass deposited at the bottom, we observe the same appearances that have been already described; and the only difference is that the cells are naturally scarcer, and consequently fewer of them are visible at the same time in the field of the microscope. The free granules are also absent from the preparations of this liquid.

C. In the mass deposited at the bottom the cells are normal and still almost unaltered. Granules also are visible in the field of the microscope.

The combination of all that we have said shows the evolution of the cell of *Saccharomyces* when deprived of light. As in former memoirs, we abstain from all theoretical considerations until the completion of the series of investigations that we have undertaken with the same purpose.

Madrid, January 11, 1876.