

1855

**Note on Urchins Burrowing in the Granite on the Coast of Brittany:
A translation of *Lory, Ch. 1855. Note sur des Oursins perforant le
granite sur les côtes de Bretagne***

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Note on urchins burrowing in the granite on the coast of Britany, by M. Ch. Lory.

Translation of "Lory, Ch. 1855. Note sur des Oursins perforant le granite sur les côtes de Bretagne, Bulletin de la Société Géologique de France. (2) 13, 43-46." by John M. Lawrence.

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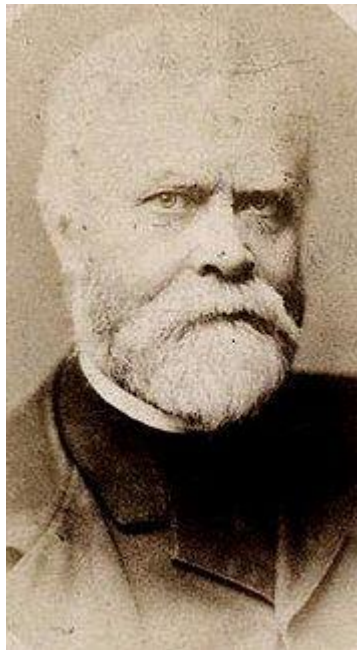
Lowy's paper is in the report of the session of the Society on November 5, 1855, presided over by one of the secretaries of the Society. The report begins with introductory comments about Frédéric Caillaud by the Secretary. Then the Secretary writes that Lowy will make a communication. Then there are comments by three members of the Society. I have included all this in the translation although they are not part of Lory's communication. The account of the session then continues without interruption with comments by Deshayes on Lowy's communication. I shall make a separate translation of them.

I have not changed the format of the report,

Charles Lory (July 30, 1823 – May 3, 1889) was born at Nantes. He graduated with a D. Sc. in 1847. In 1852 he was appointed to the chair of geology at the University of Grenoble, and in 1881 to that of the École Normale Supérieure in Paris.

He was known for his research on the geology of the French Alps.

Frédéric Caillaud (9 June 1787 – 1 May 1869) was born and died in Nantes. He travelled in Egypt, Nubia, and Ethiopia, collecting minerals and making observations. Caillaud's contributions to knowledge were so recognized that in 1824 he was awarded the French Legion of Honor."



Charles Lory



Frédéric Caillaud

The Secretary read the following extract from a letter from Nantes to M. Élie de Beaumont, by M. Cailliaud:

I have taken advantage of my package to add to the collections of the Society a specimen of ferruginous sandstone burrowed by *Echinus lividus* that I collected recently on the coast of Finistere. I would have liked to have added the *Echinus miliaris* that I found in 1850 burrowed in the same way as the sandstone in the compact limestone of the plateau of Four in my department but I have only found very few.

Soon, my compatriot M. Lory will make known to you the *Echinus* of our department in a rock and make known the fact, even more surprising to the unbelievers, that we should no longer be surprised to see *Pholas* burrow in gneiss, also by mechanical means.

I say “see” because I have had the satisfaction of being able to follow their work for eight days.

M. Lory, in placing under the eyes of the Society the specimen of sandstone mentioned by M. Cailliaud, as well as a specimen of granite in which is lodged an urchin, makes the following communication.

Note on urchins burrowing in the granite on the coast of Britany, by M. Ch. Lory.

Taking advantage of the tides at the end of last September to explore the borders of the limestone of Croisic (Loire Inférieure), I have seen a very curious new example of the burrowing in rock by some urchins. The large-grained granite, with graphic granite veins, which is the economic basis of the town of Guérande and the surrounding area, extends to the bottom of the bay of Croisic and forms the part of the coast between the small port of Turballe and the Piriac tin mine. In this interval of approximately 2 kilometers, sometimes feldspar with large grains is dominant, sometimes fine-grained, with a higher proportion of mica. But whatever its structure, it has a great tendency to disintegrate and become sand. It is in this state of breaking up and half-friability that we see it uncovered in the intertidal. The general surface of the rock in the intertidal slopes gently towards the sea. The exposed parts are covered with a layer of large seaweed and various molluscs (mussels, littorinas, patellas, etc.). But the depressions, the crevices, which remain full of water when the sea recedes and form small pools isolated at various levels, are occupied only by small algae, and contain a large population of anemones and urchins.

The latter are encountered exclusively in the small very shallow pools where there is at low tide only 3 or 4 decimeters of water at most. These small basins are under special conditions that prevent the effect of sunlight, heat and the atmosphere. This is probably what makes them suitable for plants and animals that are not seen in other depressions. In each of these pools, the urchins are generally numerous so that the bottom is literally covered with them. Each of them is in a hole that has the shape of a template. The opening is always circular and related to the diameter of the urchin that is found there. The depth of these holes is up to 6 or 7 centimeters. Generally, it is always larger than the height of the urchin so that it is difficult to remove it without breaking a large number of spines. The holes are rarely isolated. Nearly always they are adjacent to each other on the bottom of the pool but always a little below the surface or on the vertical or inclined borders that form the borders immediately below the overflow level. Often the overflow gully has deepened a little and we see a line of old holes, always empty, above the present holes. But no

other part of the granite surface has cavities of this kind. There is no doubt the holes are dug by the urchins themselves. The hole is so suited to the size of the animal, its spines are so well anchored in the interstices of the grains of feldspar quartz, that it seems probable to me the urchin never leaves its cell. In a walk of 2 kilometers from Turballe to the mine at Piriac, we can easily see a thousand urchins. I have not seen a single one at the bottom of the pool.

The urchins in question belong to the most common species on the coasts of Brittany. M. Eugène Robert reported, two years ago, their burrowing action in the Bay of Douarnez, where they burrow into a quartz sandstone cemented by iron hydroxide. Here we find they have excavated granite, not strong and solid, but cracked and demi-friable in this state preceding reduction to sand. They seem to prefer the variety with fine grains and much mica, but we have also found them on granite with large grains. Only the walls of their holes are much more rugose and bristling with quartz grains that remain protruding. The sandstone of Douarnez, as well as our granite, does not indicate any action of a liquid secreted by the urchin. This occurs only by mechanical means, breaking it up with organs it uses for this purpose.

I had the opportunity to see some days ago the locality I just described with our colleague M. Cailliaud, the curator of the Museum of Nantes, whose beautiful work on the burrowing of rocks by mollusks is known to the Society. He was kind enough to show me the place where the gneiss of Poliguen was burrowed by pholids. He told me he had observed burrows made by urchins in the friable Tertiary limestone of the Ile du Four, located near the bay of Croisic. Thus, whatever the nature of the rock, the property of being friable, at least by its usual submersion, is the necessary and sufficient condition for the urchin to burrow.

The urchin burrowing on the coasts of Brittany is considered the same species as the *Echinus lividus*, Lam., so common in the Mediterranean. However, it should be noted the latter does not appear to have the ability to burrow into the rocks. I have observed it myself in the Gulf of Ajaccio, on coasts formed of a granite that disaggregates like that of Guérande, but I have never seen burrows. The urchin takes advantage only of the natural crevices in the rocks. If it really is the same species, there is at least a very remarkable difference in behavior in the two seas.

M. Boubée remarked that the granites perforated by the urchins are already disintegrated and friable, and that this phenomenon has not been observed in unaltered rocks. This led to him to make the suggestion that it results from the movement of the spines of *E. lividus*.

M. Durocher recalled that on all the coasts of Brittany, the schistoid granite rocks are riddled with irregular cavities, and have a very uneven hardness. In direct experimentation with the action of water on these rocks, it has been recognized that their elements absorb water, beginning a chemical alteration that makes it softer. This would make possible their excavation by a weak but very prolonged mechanical action. We can thus see that the cavities begin by the physical action of water and then achieved by the urchins that we see adapted in such a perfect way.

M. Mather asked us if we have observed *Echinus lividus* burrowing to make the holes that it inhabits. If it burrows itself on the coasts of Brittany, why does it not do it in Provence where it lives in cavities and crevices of rocks, or in the algae? This we also observe on the coasts of the Ile de Candie.

M. Boubée responds that the coast of Biarritz has phenomena quite similar to those observed by M. Lory near Piriac. The rock is very densely furrowed with cavities and most are filled with urchins whose usual movement is difficult to see. He persists thus in attributing the excavation of these cavities to *Echinus lividus*, and thinks that if this animal is not burrowing in the Mediterranean as in the Ocean, it is due to the difference in the rocks.