It has no apparent relation to the character of the underlying rocks, nor to the land relief or the gross topography. And why should it? The cause of the up and down (diastrophic) movement of the land surface can be only slightly due to the elastic compression and expansion of the rocks. It is regarded as chiefly due to yielding and rock-flowage in the deep-down zone of plasticity. And this is very far below the base of any sedimentary rock.

Another interesting fact is that the isobases, or lines of equal uplift, pay no apparent respect to the great topographic features, as the deep and wide embayment of the St. Lawrence and the masses of the Adirondacks and White Mountains. And, again, why should they? These great features were produced far back in Tertiary time, and isostatic equilibrium had been long established, for both the nature of the rocks and the surface relief, before the Glacial Period. The ice caps were freshly imposed loads, with independent effect.

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THE CLASSIFICATION OF PYTHIUM

THE writer has read with some interest a note in a recent number of SCIENCE by C. P. Sideris entitled "The Proper Taxonomic Classification of Certain Pythiacious Organisms,"[1] as he has been investigating for some years those members of *Pythium* which possess filamentous sporangia, placed by Butler[2] in the subgenus *Aphragmium,* and has had an opportunity to examine minutely most of the newer species and nearly all the older ones.

It should be borne in mind that the genus *Pythium* was founded in 1858 by Pringsheim[3] on what must be regarded as a form possessing entirely filamentous sporangia (the term "sporangium" will be used here in its older sense without entering into the grounds for the distinction of pro- or pre-sporangium used by some more recent writers). Two years later de Bary[4] published his description of *P. proliferum,* a form in which the sporangium consisted of a spherical portion and a more or less elongated beak, the former structure being delimited from the rest of the hypha by a cross wall.

With the describing of *P. debaryanum* by Hesse,[5] in 1874, and de Bary's subsequent work on this species, *Pythium* became of peculiar interest to the pathologist because of the destructiveness of this species to the seedlings of various plants of economic importance. Since then, the pathological literature has contained many references to various types of diseases ascribed to *P. debaryanum,* and through it the genus has been, one might say, widely advertised.

In recent years it has become increasingly apparent that, aside from the two sporangial types heretofore described, there is a third one. Briefly, this consists of a basal portion of more or less compacted, swollen, digitate elements, separated as a whole by cross walls from the concomitant hyphae, and a filamentous evacuation tube through which the protoplasm of the two portions is discharged into a vesicle in the usual manner. This type is represented by such forms as *P. complens* Fischer, *P. aphanidermatum* (Eds.) Fitz. and others.

Fischer[6] in 1892, divided the species of *Pythium* then known into three subgenera. In *Aphragmium* he placed those forms which possess filamentous sporangia not differing from the vegetative hyphae and not cut off from these structures by cross walls. In *Nematosporangium,* he placed those forms with filamentous sporangia which did not differ from the vegetative hyphae, but were separated from them by septa. The species possessing subspherical to spherical sporangia he put in the subgenus *Sphaerosporangium.*

In 1897, Schröter[7] raised *Nematosporangium* to generic rank with two subgenera, *Aphragmium* and *Eunematosporangium.* Butler[8] proposed to retain the two subgenera of Fischer, but merged *Nematosporangium* with *Aphragmium.*

To any one who has studied the non-sexual reproduction of any of these filamentous types, it is apparent that cross walls must be laid down somewhere in the mycelium which will limit the flow of protoplasm, otherwise the whole content of the mycelium would be discharged at one time into the vesicle. In the hundreds of examples of such reproductive activity observed by the writer among various species which possess entirely filamentous sporangia, delimiting cross walls have always been observed.

These preliminary considerations lead to Mr. Sideris's suggested treatment of the genus.

Aside from the fact that he does not separate the entirely filamentous sporangial forms, such as *P. dictyosporum* Racib., *P. afertile* Kanouse and Hum-

[1] C. P. Sideris, "The Proper Taxonomic Classification of Certain Pythiacious Organisms," SCIENCE, 71: 323–324, March 21, 1930.

[2] E. J. Butler, "An Account of the Genus Pythium and Some Chytridiaceae," Mem. Dept. Agr. India, Bot. Series 1: 5, 162 pp., illus., 1907.

[3] N. Pringsheim, "Beitrage zur Morphologie und Systematik der Algen II," *Pringsheim's Jahrb. für wiss. Botanik,* 1: 284–306, 1858.

[4] A. de Bary, "Einige neue Saprolegnieen," *Pringsheim's Jahrb. für wiss. Botanik,* 2: 169–192, 1860.

[5] R. Hesse, "Pythium debaryanum, ein endophytischer Schmarotzer, etc.," Inaugr. Diss. Halle, 1874.

[6] A. Fischer, "Phycomycetes," in Rabenhorst's "Kryptogamenflora von Deutschland, etc.," 4: 391–410, 1892.

[7] J. Schröter, "Fungi," in Engler and Prantl's, "Die natürlichen Pflanzenfamilien," I[1]: 104, 1897.

[8] E. J. Butler, *loc. cit.*

phrey, etc., from those herein termed "lobulate" types, as represented by *P. aphanidermatum, P. arrhenomanes* Drechsler, etc., he applies the name *Pythium,* not to those entirely filamentous forms on which the genus was founded, but to those with spherical sporangia. In the amended form, as proposed by Sideris, *Nematosporangium* groups together species having two different types of sporangia, *i.e.,* the entirely filamentous and the lobulate ones. *Nematosporangium,* in the sense of Fischer and Schröter, fits well those forms placed in *Aphragmium,* for, as has been pointed out, Aphragmium types are an impossibility. As the name *Pythium* already exists for these forms, and, in fact, was first applied to the very species placed by Schröter in his genus *Nematosporangium* (*P. monospermum*), the latter generic name is superfluous.

The situation might be somewhat clarified if the lobulate types were placed in the genus *Rheosporangium,* the first generic name proposed for these forms (Edson).[9] While some slight changes would have to be made in defining the genus, it seems better to adopt it than to continue, in a greatly amended condition, an untenable and confusing one. This action would leave Pythium in its original sense applying to those forms possessing entirely filamentous sporangia. As to the disposition of the subspherical and spherical sporangial forms, the writer does not feel so competent to express an opinion. Several courses, however, seem open: to raise the subgenus *Sphaerosporangium* to generic rank; to merge the group with *Phytophthora,* established by de Bary in 1876, or to revive one of the several generic names proposed in the past for various members of this group. If the genus *Pythium,* in the inclusive sense of Butler, is to be broken up into several genera, as seems entirely feasible, the name *Pythium* should apply only to those entirely filamentous sporangial types on which the genus was founded and not to those forms with spherical sporangia.

The salient features by which the three genera may be separated from each other are as follows.

Pythium: Zoosporangium identical with the filamentous vegetative hyphae, consisting of a hyphal segment delimited by cross walls; the content being discharged through a hyphal branch into a vesicle formed at the apex of this structure; not proliferating; the discharged protoplasm entirely delimited into zoospores within the vesicle.

Rheosporangium: Zoosporangium consisting of a subspherical portion or a series of more or less compacted, intercommunicating, lobulate elements cut off from the vegetative hyphae by septa, and a filamentous evacuation tube which arises from the basal portion and through which the content of the whole complex is discharged into the vesicle; not proliferating; the discharged protoplasm entirely delimited into zoospores within the vesicle.

Phytophthora or *Sphaerosporangium* n. gen.: Zoosporangium narrowly ovoid, spherical or citriform, clearly distinguishable from the vegetative hyphae from which it arises and is separated by a cross wall; renewed by proliferation or branching of various types; vesicle present or absent; zoospores sometimes clearly delimited within the sporangium and emerging fully formed.

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[9] H. A. Edson, "Rheosporangium Aphanidermatus, A New Genus and Species of Fungus Parasitic on Sugar Beets and Radishes," *Journ. Agr. Res.,* 4: 279–291, 1915.

TWO NEW DOMINICAN FORMATIONAL NAMES

THE MARINE PLIOCENE GATO FORMATION

THE later Señor Rodolfo Cambiarso, a resident of Santo Domingo City, presented me, in 1916, with a very fine fossil sea urchin that he had collected at Gato, Provincia del Seibo, on Rio Chavon, northeast of the port of La Romana, Dominican Republic. This town is shown upon the Santo Domingo-San Juan folio map of the American Geographical Society of New York. I gave the specimen to the U. S. National Museum, and Dr. R. T. Jackson identified it as *Clypeaster dalli* Twitchell,[1] and later described it in his "Fossil Echini of the West Indies,"[2] leaving the age indeterminate, Miocene or Pliocene.

This very handsome Dominican specimen is the only example of the species ever recorded except the type which Twitchell[3] described from near Fort Thompson, Caloosahatchee River, in the Caloosahatchee Pliocene of Florida.

In 1929, I referred my Gato beds to the marine Pliocene.[4] No other marine Pliocene has been differentiated in the Dominican Republic. I now propose for this interesting horizon, characterized by *Clypeaster dalli* Twitchell, the name Gato Formation.

The Gato formation of the Dominican Republic was laid down about the same time as the marine Pliocene beds described by Drs. Woodring and Brown[5]

[1] C. J. Maury, *Bull. American Paleontology,* No. 30, pp. 20–21, 1917.

[2] R. T. Jackson, Carnegie Inst. Washington, Publ. No. 306, p. 37, 1922.

[3] Clark and Twitchell, Monograph U. S. Geol. Surv., Vol. 54, p. 218, Pl. 99, Figs, 2a-b; Pl. 100, Figs, 8a-b, 1915.

[4] C. J. Maury, SCIENCE, p. 609, December, 1929.

[5] Woodring and Brown, "Geology of Haiti," pp. 241–242, 1924.