swarm. But, in addition to these straight and more or less rigid forms (which, it will be noticed, simulate Ehren­berg and Cohn’s “genera ” *Micrococcus, Bacterium, Bacillus,* and *Leptothrix* so closely

that any of them observed

alone would undoubtedly

have been formerly placed

apart in one of those “ gene­

ra ”), it is interesting to find

that some of the filaments

become spirally twisted and

simulate *Spirillum, Spiro-*

*chæte,* and *Vibrio,* the dis­

tinctions depending on the

relative length and thick­

ness of the filament, and the

closeness or steepness of

the coils. Moreover these

twisted filaments also break

up into shorter gliding or

ciliated portions, which at

length fall into rodlets and

“cocci” as before.

A branched zoogloea form

also occurs, and this con­

tains cocci, bacterium-like

or bacillar rods, or filaments

resembling *Leptothrix* or

*Vibrio* according to circum­

stances. In Lankester’s *Bacterium rubescens* we have an­other species which is variable in a high degree. Many other Schizomycetes have now been shown to be more or less pleomorphic,

and the researches of

Lankester, Nägeli,

Zopf, Miller, Kurth,

De Bary, and others

have laid the foun­

dation for a know­

ledge of the cir­

cumstances which

induce the changes

in form referred to ;

it is at least certain

that alterations in

the nutritive me­

dium, in the quan­tity of oxygen at

the disposal of the

organism, and in

the temperature,

&c., play their part

in the matter.

It by no means

follows, however,

that because some

species are pleomor­

phic all must be so,

and still less that no

species of Schizo­

mycetes—or only

one—exist at all ;

those who deny the

existence of species

among the Schizo­

mycetes on the evi­

dence to hand must,

to be logically consistent, deny the existence of species altogether. But even if that be allowed, some name of similar intention must be employed to denote any group

of organisms which within our experience exhibit periodi­cal repetitions of a process of development, *i.e.,* all the individuals of successive generations go through the same phases periodically. It matters not that variations—ill- defined deviations from an average or “type”—occur on the part of individuals or generations ; the periodically repeated life-history or development marks what we term a species.

The difficulties presented by such minute and simple organisms as the Schizomycetes are due partly to the few “characters” which they possess, and partly to the dangers of error in manipulating them ; it is anything but an easy matter either to trace the whole development of a single form or to recognize with certainty any one stage in the development unless the others are known. This being the case, and having regard to the minuteness and ubiquity of these organisms, we should be very careful in accepting evidence as to the continuity or otherwise of any two forms which falls short of direct and uninterrupted observation. The outcome of all these considerations is that, while recognizing that the “genera” and “species” as defined by Cohn must be recast, we are not warranted in uniting any forms the continuity of which has not been directly observed ; or, at any rate, the strictest rules should be followed in accepting the evidence adduced to render the union of any forms probable. @@1

Classification.—The limits of this article prevent our ex­amining in detail the system of classification proposed by Cohn, or the modifications of it followed by other authorities. Zopf, in the third edition of his work (1885), proposes a scheme based on the modern views as to the pleomorphism : we must refer to the original for the details, simply remarking that, apart from the ex­treme views accepted by the author, his system is impracticable to a degree and recognized by him as provisional only. Indeed any such classification must be provisional, for we are at the threshold only of a knowledge of the Schizomycetes.

The best starting-point for a modern classification of these organisms is that suggested by De Bary—the two modes of forma­tion of the spores,—and as a provisional scheme, and simply to facilitate comparison of the groups, we might perhaps employ De Bary’s two groups, and a third one to include those simple forms which show no trace of spore-formation. Many gaps exist, and many changes will probably have to be made. Meanwhile it might be advisable to classify the Schizomycetes provisionally as follows :—

Group *A.* Asporeæ.

There are no spores distinct from the vegetative cells.

I. Coccaceæ (figs. 6 and 7).

Genera : 1, *Micrococcus* (and *Streptococcus)* ; 2, *Sarcina* (and Zopf’s *Merismopedia)* ; 3, *Ascococcus.*

Group B. Arthrosporeæ (De Bary).

The vegetative cells differ in shape, size, growth, or other characters from the spores : the latter are produced by segmenta­tion.

IL Artiirobacteriaceæ.

Genera : 4, *Bacterium* (fig. 8) ; 5, *Leuconostoc ;* 6,

*Spirochæte (?).*

1. Leptotricheæ.

Genera: 7, *Crenothrix* (fig. 13); 8, *Beggiatoa* (figs. 14 and 15); 9, *Phragmidothrix* (?) ; 10, *Leptothrix.*

1. Cladotricheæ.

Genus : 11, *Cladothrix* (fig. 16).

Group C. Endosporeæ (De Bary).

Genera: 12 (figs. 9-12), *Bacillus* (and *Clostridium)*; 13, *Vibrio* (?); 14, *Spirillum* (at least in part). @@2

@@@1 Ray Lankester, *Quart. Jour. Micr. Sc.,* 1873 and 1876; Nägeli and Buchner, *Niedere Pilze,* 1882 ; Billroth, *Untersuchungen über die Vegetations formen der Coccobacteria septica,* Berlin, 1874 ; Klebs, numerous papers in *Archiv f. exp. Pathol, und Pharmacol.* ; Kurth, *Bot. Zeitung,* 1883; Prazmowski, *Biol. Centralblati,* 1884 ; Zopf, *Zur Morph. der Spaltpflanzen,* Leipsic, 1882; Cienkowski, *Zur Morpho­logie d. Bacterien,* 1876.

@@@2 For the definitions of the genera (and species) the reader is re­ferred to the special works, especially those of Zopf and De Bary ; also Winter-Rabenhorst, *Kryptogamen Flora—Pilze,* i., 1881 ; and Grove, *Synopsis of the Bacteria and Yeast-Fungi,* 1884.