a few larger are known. The various shapes assumed by the cells are shown in fig. 1 ; the filamentous and other aggregates will be described below.

Schizomycetes are ubiquitous as saprophytes in still ponds and ditches, in running streams and rivers, and in the sea, and especially in drains, bogs, refuse heaps, and in the soil, and wherever organic infusions are allowed to stand for a short time. Any liquid (blood, urine, milk, beer, &c.) containing organic matter, or any solid food­stuff (meat, preserves, vegetables, &c.), allowed to stand exposed to the air soon swarms with bacteria, if moisture is present and the temperature not abnormal. Though they occur all the world over in the air and on the surface of exposed bodies, it is not to be supposed that they are by any means equally distributed, and it is questionable whether the bacteria suspended in the air ever exist in such enormous quantities as was once believed. The evidence to hand shows that on heights and in open country, especially in the north, there may be few or even no Schizomycetes detected in the air, and even in towns their distribution varies greatly ; sometimes they appear to exist in minute clouds, as it were, with interspaces devoid of any, but in laboratories and closed spaces where their cultivation has been promoted the air may be considerably laden with them. Of course the distribution of bodies so light and small is easily influenced by movements, rain, wind, changes of temperature, &c. As parasites, certain Schizomycetes inhabit and prey upon the organs of men and animals in varying degrees, and the conditions for their growth and distribution are then very complex. Plants appear to be less subject to their attacks,—possibly, as has been suggested, because the acid fluids of the higher vegetable organisms are less suited for the develop­ment of Schizomycetes ; nevertheless some are known to be parasitic on plants. Schizomycetes exist in every part of the alimentary canal of animals, except, perhaps, where acid secretions prevail ; these are by no means necessarily harmful, though, by destroying the teeth for instance,

certain forms may incidentally be the forerunners of damage which they do not directly cause. @@1

Little was known about these extremely minute organ­isms before 1860. Leeuwenhoek figured *Bacteria* as far back as the 17th century, and O. F. Müller knew several important forms in 1773, while Ehrenberg in 1830 had advanced to the commencement of a scientific separation and grouping of them, and in 1838 had proposed at least sixteen species, distributing them into four genera. Our modern more accurate though still fragmentary knowledge of the forms of Schizomycetes, however, dates from Cohn’s brilliant researches, the chief results of which were pub­lished at various periods between 1853 and 1872 ; Cohn’s classification of the *Bacteria,* published in 1872 and ex­tended in 1875, has in fact dominated the study of these organisms almost ever since. He proceeded in the main on the assumption that the forms of *Bacteria* as met with and described by him are practically constant, at any rate within limits which are not wide : observing that a minute spherical *Micrococcus* or a rod-like *Bacillus* regularly pro­duced similar micrococci and bacilli respectively, he based his classification on what may be considered the constancy of forms which he called species and genera. As to the constancy of form, however, Cohn maintained certain reser­vations which have been ignored by some of his followers. The fact that Schizomycetes produce spores appears to have been discovered by Cohn in 1857, though it was expressed dubiously in 1872; these spores had no doubt been observed previously. In 1876, however, Cohn had seen the spores germinate, and Koch, Brefeld, Pratzmowski, Van Tieghem, De Bary, and others confirmed the discovery

in various species.

The supposed constancy of forms in Cohn’s species and genera received a violent shock when Lankester in 1873 pointed out that his *Bacterium rubescens* (since named *Beggiatoa roseo-persicina,* Zopf) passes through conditions which would have been described by most observers influ­enced by the current doctrine as so many separate “ species” or even “ genera,”—that in fact forms known as *Bacterium, Micrococcus, Bacillus, Leptothrix,* &c., occur as phases in one life-history. Lister put forth similar ideas about the same time; and Billroth came forward in 1874 with the startling view that the various “ form-species ” and “form­genera” are only different states of one and the same organism. From that time to the present the discussion as to the limits of “species ” among the Schizomycetes has been maintained ; much extravagance has resulted, as well as valuable additions to our knowledge of the forms. Klebs (1875) and Nägeli (1877) upheld similar views to those suggested by Lankester ; and the researches of Cien- kowski, Zopf, Kurth, and De Bary have rendered it clear that forms employed by Cohn to define genera and species (it should be borne in mind that Cohn recognized their provisional nature) occur as phases in one and the same life-history. Zopf showed (1882) that minute spherical “cocci,” short rodlets (“bacteria”), longer rodlets (“ba­cilli”), and filamentous (“leptothrix”) forms as well as curved and spiral threads (“ vibrio,” “ spirillum”), &c., occur as vegetative stages in one and the same Schizomycete (cf. fig. 16). In the meantime, while various observers were building up our knowledge of the morphology of the Schizomycetes, others were laying the foundations of what is known of the relations of these organisms to fermenta-

@@@1 See De Bary, *Morphologie und Biologie der Pilze,* 1884, and *Vorlesungen über Bacterien,* 1885 ; Zopf, *Die Spaltpilze,* 3d ed., 1885; Cohn, *Beitr. zur Biol. der Pfl.,* Hft. 2, 1872; Magnin, *Les Bactéries,* 1878 ; Burdon-Sanderson, *(Quart. Jour. Micros. Sc.,* 1871 ; Tyndall, *Floating Matter of the Air,* 1881 ; Miflet, in *Cohn's Beitr. zur Biol.,* iii. Hft. i., 1879 ; Pasteur, *Jour. de Chim. et de Phys.,* ser. iii., 1862 ; Miquel, *Comptes Rendus,* 1878, and *Annuaire de l’ob­servatoire de Montsouris,* 1877 *sg.*