species and the conditions (the medium, temperature, &c.), enormous collections of isolated cells may cloud the fluid in which they are cultivated, or form deposits below or films on its surface ;

valuable charac­ters are sometimes obtained from these appearances.

When these dense “ swarms ” of ve­getative cells be­come fixed in a matrix of their own swollen con­tiguous cell-walls, they pass over into a sort of resting state as a so-called zooglœa (fig. 3).

One of the most remarkable phenomena in the life- history of the Schizomycetes is the formation of this zooglœa stage, which corresponds to the “ palmella ” con­dition of the lower

*Algae.* This occurs

as a membrane on

the surface of the

medium, or as irre­

gular clumps or

branched masses

(sometimes several

inches across) sub­

merged in it, and

consists of more or

less gelatinous ma­

trix enclosing in­

numerable “cocci,”

“ bacteria,” or other

elements of the

Schizomycete con­

cerned. Formerly

regarded as a distinct genus—the natural fate of all the various forms—the zooglœa is now known to be a sort of resting condition of the Schizomycetes, the various elements being glued together, as it were, by their enormously swollen and diffluent cell-walls becoming con­tiguous. The zooglœa is formed by active division of single or of several mother-cells, and the progeny appear to go on secreting the cell-wall substance, which then

absorbs many times its volume of water, and remains as a consistent matrix, in which the cells come to rest. The matrix—*i.e*., the swollen cell-walls—in some cases consists mainly of cellulose, in

others chiefly of “ my- coprotein,” the substance said to be met with in the protoplasm ; the ma­trix in some cases is horny and resistent, in others more like a thick solution of gum. It is intelligible from the mode of formation that foreign bodies may be­come entangled in the gelatinous matrix, and compound zooglœæ may arise by the apposition of several distinct forms, a common event in ma­cerating troughs (fig. 3,

A). Characteristic forms may be assumed by the young zooglœa of differ­ent species,—spherical, ovoid, reticular, filament­ous, fruticose, lamellar,

&c.,—but these vary considerably as the mass increases or comes in contact with others. Older zooglœæ may precipi­tate oxide of iron in the matrix, if that metal exists in small quantities in the medium. Under favourable conditions the elements in the zooglœa again become active, and move out of the matrix, distribute themselves in the surrounding medium, to grow and multiply as before (fig. 4). If the zooglœa is formed on a solid substratum it may become firm and horny; immersion in water softens it as described above.

*Spores.—*Spores or resting-cells are now known in many Schizomycetes (fig. 5). They may be formed in two ways.

In *Leuconostoc, Bacterium zopfii, Crenothrix, Beggiatoa,* and *Cladothrix* the spore is simply one of the smallest segments (“cocci”) into which the filament at length breaks up. De Bary terms such forms “ arthrosporous ” *(cf.* figs. 8, 13, 14, and 16). In others the formation of the spore is “endosporous” (De Bary). It begins with the appearance of a minute granule in the protoplasm of a vegetative cell ; this granule enlarges, and in a few