SYSTEMATIC VS. CLASSIFICATORY TAXONOMY
AND SPECIOLOGY OF THE ACTINOMYCETALES*

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Recent development of theoretical taxonomy, at least in Italy, demands that the taxonomy of microorganisms be distinguished as systematics and classification.

Systematic taxonomy (or systematics) distributes the microorganisms of a certain rank with due consideration of all the affinities, immediate or remote, and the probable descent. Their interrelationships may be expressed by development of a phylogenetic tree. This is, indeed, as far as it is realizable, a "natural" taxonomy, developing an increasing complexity with the progress of knowledge, but more or less objective.

Classificatory taxonomy (or classification) distributes the microorganisms of a certain rank on the basis of a reduced (small) number of easily recognizable characteristics showing divergences or similarities, without consideration of relationship or descent. The affinities or divergences are expressed in keys (frequently dichotomous). This is, of course, an artificial taxonomy, simplified and more or less subjective. (It is always possible to develop analytical keys from systematics in order to ease the routine work of determination).

Most taxonomy is mixed, but the systematic stage is increasingly evident with the advance of our understanding of each group of microorganisms.

This twofold scheme is obvious in any arrangement. A book of unknown content may be "classified" according to a number of physical characteristics such as weight, size, number of pages, paper color or quality, etc., but it may be "systematized" only after knowledge of the content. A better knowledge of the content will correspond to a better systematization of the book (e.g. according to a decimal or similar library classification).

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The taxonomy of the Actinomycetales is still in the classificatory stage. Specialists may indeed agree to select certain characteristics and to establish their hierarchy in order to develop a standardized classification in agreement with actual knowledge.

The taxonomy of microorganisms is complicated by the formal levelling of "species", delimited on the basis of deeply divergent criteria. In general we may distinguish:

A) Morphologic criteria

- a) Macromorphologic characteristics (in one case of the Actinomycetales, used more frequently for genera than for species).
- b) Micromorphologic characteristics (seldom used).
- c) Biometric characteristics (of unusual application).

B) Biologic criteria

- a) "In vivo" specialization.
 - 1) Host specialization (used for Actinomycetales parasitic on man, animals, or plants).
 - 2) Organotropic specialization (as above).
 - 3) Pathognomic characteristics (as above).
- b) "In vitro" specialization.
 - 1) Physiognomic characteristics (e.g. color and shape of colonies on solid and liquid media) (of common use).
 - 2) Physico-chemical characteristics (e.g. growth response to temperature; liquefaction of proteins; milk peptonization) (of common use).
 - 3) Biochemical characteristics (e.g. H_2S production; NO_3 reduction; C and N compound utilization; antibiotic production; sensibility to antibiotics; nature of pigments and cell-wall; serological reactions) (of common use).

The following rules are proposed:

1. Acceptance of specific rank with Latin binomial for the 'series', namely, complex of clonal, applied populations (as, e.g., in several genera of molds). Intraserial clones (strains) are designated with the binomial of the series followed by numbers or letters;
2. Species ('series') are accepted (recognized) only if

they differ in at least two characteristics not included in the same group of criteria, e.g. not only biochemical or cultural, etc. (Apparently speciation in nature is achieved by several, parallel and simultaneous modifications);

3. Strains differing for one or a few allied characteristics are infraspecific (infraserial) (unnamed) taxa;

4. Description and recognition of species ('series') and of individual clones must be checked by qualified specialists, with sufficient knowledge of the group and in possession of cultures suitable for comparison;

5. Cultures should be distributed among specialists and Type Culture Collections.