

A "FIVE-CRITERIA-APPROACH" (FCA) IN TAXONOMY OF CYPRAEIDAE

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Abstract: A "Five-Criteria-Approach" (FCA), based on conchological characters, has been developed as a tool for determining the taxonomic identity of recent species and subspecies of Cypraeidae during the project "Intraspecific variation in living cowries." This approach consists of a single conchological criterion for a species, three conchological criteria for a subspecies, and a requirement to present the scientific evidence for any taxonomic conclusion as the fifth criterion. This project has been ongoing since 1999 and its preliminary results based on the FCA approach are currently in a stage of preparation for publication. This approach may possibly be applied in the study of other families of molluscs.

Key words: Mollusca, Gastropoda, Cypraeidae, taxonomy, conchological method, five criteria approach.

Species of living molluscs consist usually of interbreeding populations that may share sometimes the same area with other similar species. Diagnosing species of recent Cypraeidae and descriptions of new species are usually based on conchological characters only. The same methods are used for separating and describing subspecies, which are part of the species-complex, but geographically separated from other populations of the same species, and have reached a recognizable stage in the process of speciation. In the project "Intraspecific variation in living cowries" a conchological method has been developed based on five criteria. These criteria (and several definitions) are partly adopted from the malacological literature and partly developed during the project. This set of five criteria is named here FCA—the "Five-Criteria-Approach".

Criterion of species: groups of similar shells should be treated as different species if they can be separated by at least one substantial, well-recognizable character—the main diagnostic shell character (MDSC)—showing no intermediates even in extreme specimens; subadult and aberrant specimens excluded.

- a) As many shells as possible should be examined for establishing the MDSC.
- b) It should be proven in a description of a new species that the MDSC is not an occasional form like an unusual color of the shell, a variation in the dorsal pattern, shape or profile, presence or absence of basal and dorsal spots, dorsal bands, etc.
- c) A poorly based choice of MDSC will probably lead to confusion at some later stage.

Three criteria of subspecies

Subspecies are groups of geographically separated populations of a species of which the majority (70% or more) of shells differ from other populations of the same species by at least one constant diagnostic character, which is the main diagnostic shell characteristic of the subspecies. The three criteria of subspecies are:

1. All molluscs of a subspecies share the main diagnostic shell characters of the same species (the MDSC).
2. Populations of a subspecies should be geographically separated from other populations of the same species.
3. A subspecies should differ from other populations of the same species by at least one statistical (or constant) shell character.
 - a) Geographical separation between subspecies does not mean the existence of a clear border between subspecies. Often there may be an intermediate zone between subspecies in which shell characters are mixed, but separation should be apparent as, for example, between populations of the same species from East Africa, the West Pacific Ocean, and Polynesia.
 - b) Any measurable shell character can be used for calculating a diagnostic shell characteristic: the shell length, width etc.
 - c) The presence or absence of a shell character that can be counted and interpreted as a shell characteristic: the number of teeth; the number of shells in which the dorsal color pattern, blotch, bands, marginal spots are present or absent, etc.
 - d) Diagnostic shell characteristics should be calculated using substantially large batches of shells (several dozen at least, the more the better). The correct choice of the main diagnostic shell characteristic ensures repetition of a diagnosis.
 - e) A weak point: failure to use a large number of shells may give a distorted picture of the population.

The 5th criterion is a need to present the scientific evidence for any taxonomic conclusion. This means that a description of a species or subspecies or a decision regarding their taxonomic level should be based on and confirmed by the scientific evidence.

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