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SEXUAL DIMORPHISM IN THE CYPRINID FISHES,
MARGARISCUS AND *COUESIUS*, AND ALLEGED
HYBRIDIZATION BETWEEN THESE GENERA

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THE staff of the Division of Fishes of the University of Michigan Museum of Zoology is currently engaged in a series of studies (Hubbs and Kuronuma, 1942; Hubbs, Hubbs, and Johnson, in press; Hubbs and Miller, in press; Hubbs, Walker, and Johnson, in press) designed to analyze the hybridization in nature between fish species. It was therefore with interest that we noted the recent statement that "in Moran's Bath Tub [in the Saskatchewan River System, Glacier National Park, Montana] *Margariscus* and *Couesius* appear to have hybridized to a limited extent" (Schultz, 1941: 34).

Since no data on the presumed hybrids were given, a further study of the problem was undertaken, with the consent and co-operation of Dr. Leonard P. Schultz, now Curator of Fishes in the United States National Museum. For this investigation Schultz loaned all the National Museum material of *Margariscus* and *Couesius* from Moran's Bath Tub, and informed me that the remainder of the large series preserved in the field was deposited in the collections of the University of Utah and the University of Washington. Professors R. V. Chamberlin and W. F. Thompson of the universities of Utah

and Washington respectively obligingly sent on for study the specimens in their charge.

I have now re-examined all of the pertinent material, comprising about two hundred specimens of each of these genera in the collection from Moran's Bath Tub, and have failed to find a single one with the characters that would surely be expected in a *Margariscus* × *Couesius* hybrid. Almost all studies on interspecific hybridization in fishes, including the recent contributions mentioned above, have demonstrated that the hybrids are intermediate in all systematic characters (Hubbs, 1940: 205-9).

Among the North American cyprinids *Margariscus* and *Couesius* seem to be relatively resistant to hybridization. Only a few specimens at hand appear to represent hybrids between these minnows and species of other genera. No *Margariscus* × *Couesius* crosses are included.

In carefully checking the specimens of *Margariscus margarita nachtriebi* and *Couesius plumbeus dissimilis* from Moran's Bath Tub, a possible source of confusion was found in the sexual dimorphism. The differentiation due to sex involves in part the features by which the species differ from one another. Failure to consider the sexual dimorphism may have led to the impression that hybrids occur. The greatest contrast in several features is between males of *Margariscus* and females of *Couesius*; *Margariscus* females and *Couesius* males are somewhat intermediate.

An appreciation of the sexual dimorphism, and an analysis of characters newly discovered as well as previously recognized, makes it possible to identify every specimen in the collection, whether male or female, adult or young. A statement of the distinctive features, with particular reference to sexual dimorphism, follows:

DISTINGUISHING FEATURES BETWEEN *Margariscus margarita*
nachtriebi AND *Couesius plumbeus dissimilis*, AS
REPRESENTED BY SPECIMENS FROM MORAN'S
BATH TUB, GLACIER NATIONAL PARK

NOTE.—It was not thought necessary to dissect out and count

the pharyngeal teeth, which in the main row usually number 5-4 in *Margariscus* and are consistently 4-4 in *Couesius*, and which provide perhaps the most fundamental distinction between the genera.

SCALES

Margariscus: generally smaller (counted in only a few specimens); usually more nearly round, scarcely shield-shaped, without a well-differentiated basal field. These microscopic features were examined in a number of specimens of each species, including most of those concerning the identification of which the slightest doubt was entertained.

Couesius: averaging larger and fewer; usually more elongate, and more or less strongly shield-shaped, with the basal field boldly set off by reason of close-set circuli, conspicuous basolateral angles, and a line of sharply angulated ridges between these basolateral angles and the focus.

MODIFICATION OF SCALES ON BREAST IN MALES

Margariscus: a rather narrow band of scales, modified as in *Couesius*, but to a lesser degree, paralleling the shoulder girdle.

Couesius: most of breast region with narrow, thickened, especially tuberculate scales, paralleling the margin of the shoulder girdle. This nuptial modification in *Margariscus* and *Couesius* has been mentioned by Koster (1939: 205-6). As Koster noted these genera approach *Pfrille* and *Chrosomus* in this respect, but the regular comblike rows of nuptial spines on the breast of those genera are by no means duplicated, and the similarity is probably the product of parallel evolution.

ORIGIN OF DORSAL FIN

Margariscus: midway between end of hypural and any point from just behind eye to front of pupil.

Couesius: midway between end of hypural and any point from middle of pupil to tip of snout. The slight overlap in this measurement is due to sexual dimorphism. In each genus the fin is located farther forward in adult males than in fe-

males. The distinction is rather sharp when specimens of one sex are compared.

FORM OF HEAD

Margariscus: deeper, and more bluntly rounded anteriorly, particularly in adult males.

Couesius: moderately slender, with more produced and less decurved muzzle. The difference is not sharp in young and females, but is very obvious in adult males.

PREMAXILLARIES

Margariscus: subterminal to terminal in females; usually definitely included in adult males.

Couesius: strictly terminal in females; barely to little included in adult males.

GAPE

Margariscus: often slightly more curved and oblique in females; much more so in adult males.

Couesius: nearly straight and only moderately oblique in each sex.

UPPER LIP

Margariscus: thinner, with little thickening on mid-line.

Couesius: thicker, especially on mid-line, appearing rather shield-shaped as seen from in front (much as in *Semotilus atromaculatus*).

BARBEL

Margariscus: usually lacking; when developed either a mere flap or a minute to small lappet; located slightly to far in advance of end of gape.

Couesius: consistently well-developed (for a North American cyprinid), except on one or both sides of some young; lappet-shaped to threadlike; located little in advance of end of maxillary (sometimes over end of gape).

ANGLE OF OPERCLE

Margariscus: more broadly rounded.

Couesius: more sharply rounded.

ISOLATED DARKENED SCALES ON SIDES OF BODY

Margariscus: more or less conspicuous, but very variable in number and arrangement. This variability is due to the fact, discovered by Langlois (1920:161), that these specially darkened scales are the regenerated ones.

Couesius: usually inconspicuous, commonly barely evident, but occasionally rather conspicuous.

PIGMENTATION ON SIDES OF HEAD

Margariscus: whole side of face tending to be sprinkled with melanophores, without a well-developed band of pigment down the preopercle; cheeks rather solidly covered with thick-set color cells, but sometimes, especially in females, with a slightly developed, unpigmented V in this region; opercular membrane with pigmentation mostly above the angle; adult males only with a submarginal file of minute melanophores extending ventrally from the main dark patch (this secondary row of pigment cells is occasionally faint in males from Moran's Bath Tub and is represented weakly in a few of the females; at other localities it is either less well or better developed, but the relative difference between the sexes holds).

Couesius: a deeply darkened band extending along the vertical arm of the preopercle, preceded, on the cheek, by a light V, of varying size and usually a continuous extension of the prominent light lower sides of the head; opercular membrane pigmented in a band that extends around the angle of the opercle, typically without a ventral-extending band of minute melanophores (weakly developed in a few adult males).

Schultz's figures of *Margariscus margarita nachtriebi* (1941: 34, Fig. 22) and of *Couesius plumbeus dissimilis* (1941: 33, Fig. 21) illustrate some of these specific differences.

SUMMARY

The suggested hybridization between *Margariscus margarita nachtriebi* and *Couesius plumbeus dissimilis* in Glacier National Park is not verified by a re-examination of the material

involved. These species exhibit a marked sexual dimorphism in several features of form and coloration. The females of *Margariscus* and the males of *Couesius* tend to be intermediate between the males of *Margariscus* and the females of *Couesius*. When the differences between the sexes are considered, along with the numerous systematic differences between the two forms, it is possible to identify all the specimens as of the one or the other kind.

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