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IN VITRO GONADAL STEROIDOGENESIS IN RELATION TO SEX-INVERSION IN THE PROTANDROUS SEABASS *LATES CALCARIFER*.

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The tropical seabass *Lates calcarifer* is an important commercial fish for aquaculture and fisheries in the Indo-Pacific area and it has been introduced in French Polynesia for breeding in sea-cages. Control of sex-inversion in this hermaphrodite species is required for the management of the spawners stock.
In Tahiti this protandrous fish underwent sex-inversion after the annual reproductive season. Histological studies of the gonads has been performed during a whole year sexual cycle. The main features of the various stages of the sex-inversion process were: degeneration of the male germinal tissue (early inverting stage), appearance of a peripheral female germinal tissue with persistence of degenerative male cells (mid inverting stage), and centripetal proliferation of the female germinal tissue with no more male cells (late inverting stage). Furthermore, this process required deep morphological changes in the gonads because of a strong dimorphism between testis and ovary.

In parallel to the histological analysis, (1,2,6,7.^{3}H) Androstenedione (And) metabolism (incubation of 1 g of minced tissue, 1 h, t=29$\pm$1 °c, without cofactor) by the gonads was studied *in vitro* at various sexual stages including early and late inverting stages. Metabolites were identified by means of thin layer chromatography, high performance liquid chromatography and recrystallization to constant specific activity.
In the male gonad at the spermiation stage (testis full of spermatozoa) incubations gave the following products: Testosterone (4Androsten17ßol-3one, T), 5ßAndrostan3,17dione (5ßAnd), Etiocholanolone (5ßAndrostan3αol-17one, Et), 5ßAndrostan3ßol-17one (5ßAnd3ßol), 5ßAndrostan17ßol-3one (5ßT), 5ßAndrostan3α17ßdiol (5ßAnd3α17ßdiol) and 11ßhydroxy-androstenedione (4Androsten11ßol-3,17dione, 11ßAnd).
In the early inverting stage we identified 11ßAnd, Adrenosterone (4Androsten3,11,17trione, Ad), 11ketotestosterone (4Androsten17ßol-3,11dione, 11KT) 11ßhydroxytestosterone (4Androsten11ß,17ßdiol-3one, 11ßT), T, 5ßAnd, 5ßT, Et and 5ßAnd3ßol.
In the late inverting stage only T and 5ßAnd have been identified, but the main metabolite (up to 50% of all the metabolites) was an unknown oestrogen like compound.
In the female gonad at the previtellogenesis stage (ovary mainly filled with previtellogenetic oocytes) we found T, 5ßAnd, Et, 5ßAnd3α17ßdiol and oestrone (E1).

To summarize, 17ßhydroxysteroid deshydrogenase (17ßHSD), 5ß reductase (5ßR) and 3α hydroxylase (3αH) were found in all incubations, while aromatase was only detected in the female and 3ßH and 11ßH only in the male and the early inverting stage. In addition to this high 11ßH activity in the early inverting stage, we characterized a high 11ßHSD activity. These important enzymatic activities have previously been described in testicular regression stage of the protandrous *Amphiprion frenatus* (LATZ *et al*,. 1991), and *Pagellus acarne* (REINBOTH *et al*,. 1986). Furthermore, in gonochoristic fish gonads this 11ßH activity has been considered to be a male characteristic, but physiological roles of 11 oxygenated androgens remain unclear especially during protandrous sex-inversion.
Attempts are now being made to characterize the principal unknown metabolite found in the late inverting stage with the view of testing its biological activity on the sex-inversion process.

LATZ, M., STAHLSCHMIDT-ALLNER, P., REINBOTH, R, 1991. In Scott, Sumpter, Kime and Rolfe Eds. Proceedings of the fourth international symposium on the reproductive physiology of fish. Norwich, U.K., 7-12 July 1991. 89-91.

REINBOTH, R., BECKER, B., LATZ, M, 1986. Gen. Comp. Endocrinol. 62, 335-340.