

Abstract

Spermatogenesis in Lake Magadi tilapia (*Alcolapia grahami*), a cichlid fish endemic to the highly alkaline and saline Lake Magadi in Kenya, was evaluated using light and transmission electron microscopy. Spermatogenesis, typified by its three major phases (spermatocytogenesis, meiosis and spermiogenesis), was demonstrated by the presence of maturational spermatogenic cells namely spermatogonia, spermatocytes, spermatids and spermatozoa. Primary spermatogonia, the largest of all the germ cells, underwent a series of mitotic divisions producing primary spermatocytes, which then entered two consecutive meiotic divisions to produce secondary spermatocytes and spermatids. Spermatids, in turn, passed through three structurally distinct developmental stages typical of type-I spermiogenesis to yield typical primitive anacrosomal spermatozoa of the externally fertilizing type (aquasperm). The spermatozoon of this fish exhibited a spheroidal head with the nucleus containing highly electron-dense chromatin globules, a midpiece containing ten ovoid mitochondria arranged in two rows and a flagellum formed by the typical 9 + 2 microtubule axoneme. In addition, the midpiece, with no cytoplasmic sheath, appeared to end blindly distally in a lobe-like pattern around the flagellum; a feature that was unique and considered adaptive for the spermatozoon of this species to the harsh external environment. These observations show that the testis of *A. grahami* often undergoes active spermatogenesis despite the harsh environmental conditions to which it is exposed on a daily basis within the lake. Further, the spermiogenic features and spermatozoal ultrastructure appear to be characteristic of Cichlidae and, therefore, may be of phylogenetic significance.