

## Pharmacological properties of triterpenoid molluscicides from African Combretaceae

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Bilharzia (Schistosomiasis) is an infectious disease caused by the parasitic trematode *Schistosoma*. It is a life-threatening disorder in Third World countries and constitutes a major source of morbidity and mortality in Africa. In tropical and sub-tropical African countries, man and his domestic animals are often afflicted by bilharzia, but children are more prone to the debilitating effects of the malady. Bilharzia parasitic worms (*Schistosoma haematobium*, *S. mansoni*, etc.) usually infect man during bathing, washing or paddling in water that is infected with snail intermediate hosts (*Biomphalaria*, *Bulinus* and other species of fresh water snails) shedding the parasites. For many decades, treatment of bilharzia in Africa depended mainly on imported, costly, synthetic drugs. The economic burden imposed on patients has thus rendered the pharmacotherapy of schistosomiasis ineffective in the continent. In recent years, however, as a result of continuous search for potent chemical compounds that are active against the parasites and/or their intermediate hosts, a number of potentially-usefully molluscicidal compounds have been isolated from some African medicinal plants. The medicinal plants of promise as molluscicides belong to diverse families and their active compounds vary widely in their chemical structures. To date, scientifically proven plant molluscicides have been isolated from *Tetrapleura tetrapleura* (family: Mimosaceae)-aridanin, while the iridoid genipin and its 10-acetyl derivative, genipin acetate, were isolated from *Apodytes dimidiata* (family: Icacinaceae). More recently, a series of acidic triterpenoids and their glycosides, have been isolated from *Combretum* species, particularly *Combretum molle*, *C. imberbe*, etc. (family: Combretaceae). Because of their potential usefulness as "Third World Molluscicides", and also because of the traditional folkloric usefulness of *Combretum* species in other disease conditions in Africa, it was thought desirable to examine the pharmacological actions of the triterpenoid molluscicides from African combretaceae in some laboratory animals.

The effects of the sodium salts of the triterpenoid acids, mollic and imberbic acids, and their glycosides were examined *in vitro* on agonist-and-electrically-induced contractions of isolated extravascular and vascular smooth, skeletal, and cardiac muscle preparations, as well as on organ-systems of some laboratory animals *in vivo*. Young adult laboratory mammals (rats, guinea-

pigs, rabbits, and cats), amphibians and domestic chicks were used. The *in vitro* and *in vivo* experimental models used were prepared and set up as described in detail by Ojewole (1976). Data obtained from these controlled experiments were pooled; analysed statistically by Student's t-test; and translated into results.

The triterpenoid molluscicides (sodium salts of mollic and imberbic acids and their glycosides) from African combretaceae showed a battery of pharmacological actions in common. Our experimental studies revealed that at low to moderate doses (5-500 µg/ml *in vitro* and 1-50 mg/kg *in vivo*), the compounds: (i) inhibited agonist-and-electrically-induced contractions of isolated vascular and extravascular smooth muscles in a concentration-dependent manner; (ii) inhibited adrenergic and cholinergic autonomic transmissions; (iii) relaxed skeletal muscles and blocked neuromuscular transmission; (iv) decreased the rate and force of myocardial contractility both *in vitro* and *in vivo*, and (v) dose-dependently lowered arterial blood pressure in both normotensive and hypertensive experimental animals. The mechanism of action of the compounds on agonist-and electrically- provoked contractions of the isolated muscle preparations is likely to be non-specific in nature.

The experimental evidence provided in the present study clearly show that the triterpenoid molluscicides from African combretaceae possess a catalogue of interesting pharmacological actions in common. Earlier studies have shown the compounds to possess strong molluscicidal activity; and anti-HIV, antimicrobial and anti-inflammatory properties (Rogers and Verotta, 1996). Although the exact mechanisms of actions of the compounds are still obscure, and detailed pharmacological studies are in progress, we strongly feel that the use of African combretaceae as "Third World Plant Molluscicides" should be encouraged and maximally promoted.

### References:

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