A reptilian gift… painless dentistry



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The Journal front cover has in recent years featured the TEETH of AFRICA through mammals and fishes, has offered a glimpse of the relevance of medications from our indigenous plants… and now it is the turn of the Reptiles. And what an intriguing dental odyssey is spelt out in the development of the dental arrays of our slithering, crawling, swimming fellow denizens! Zahradnicek *et al* unraveled some of the intricacies and in 2014 published a comprehensive review in Frontiers of Physiology.[1]

The essential and most basic reptilian teeth are conical with a single apical cusp and serve to hold prey, allowing for gulping movements as the morsel is moved to the oesophagus. The python is a typical unicuspid snake and is capable of delivering a severe bite. However, reptilian teeth are not limited to the single cusp and multi-cuspid teeth are found in some species. The dilemma is whether the development of additional cusps follows a pattern similar to that of the mammals- or whether reptiles have a separate method of tooth development? Do reptiles rely on the enamel knot as the signaling mechanism whose influence leads to in the folding of the inner enamel epithelium which in mammals results in multiple cusps? The investigators examined foetal material in several reptile species and were able to describe, at least in species having more complex teeth, two distinct structures which appeared on the crown of the developing tooth, which they identified as enamel crests and dental cusps, but not really equivalent to an enamel knot. Whilst commonly seen, the morphology of these structures is species specific, and there are probably different developmental mechanisms involved. The essential feature is that the inner epithelial membrane does undergo folding, and that leads to the development of cusps, just as in mammals. This is seen more evidently in the highly complex teeth of the Nile monitor lizard. An intriguing similarity.

The Journal will be adorned by pictures of some of the bewildering variety of reptiles found in Africa, and will explore pertinent features of their dentition.

To take a step back, the more one delves the more one realizes just how marvelous are those 32 mammalian teeth we are privileged to develop, and the enormous relevance of maintaining their health and integrity. The World attempts to recognize their importance by assigning a Day to stimulate awareness of oral health and disease and this is scheduled in 2017 for March 20th with the theme Live Mouth Smart. Organised by the FDI the project aims to stimulate awareness and action from Governments and populace on Oral Health measures. (More elsewhere in this issue.)

Strangely, dentistry (and medicine) is in debt to reptilian teeth, hence did the concept of the hypodermic syringe have its "Eureka"? Admittedly, the Romans had adopted the concept of hollow tubes after a Greek myth related how Pan used hollow reeds to fashion his famous pipes whilst searching for a nymph named Syrinx, hence "syringe"! But the Romans had also observed how toxins were delivered through the hollow teeth of snakes. The idea stuck! Simple piston syringes were described by the first century Roman scholar Aulus Cornelius Celsus and mention was also made by the Greek surgeon Galen. Some 800 years later Ammar bin Ali al-Mawsili, an Egyptian surgeon, used hollow glass tubes and a piston to remove cataracts from the eyes of his patients.[2] The underlying theoretical basis for the workings of a syringe are embodied in Pascal's law, "when there is an increase in pressure at any point in a confined fluid, there is an equal increase at every other point in the container." And Pascal himself invented the first modern syringe. Would you believe that an architect, Sir Christopher Wren of London fame, undertook the first intravenous experiment when he used hollow goose feather quills linked to a syringe to inject opium into stray dogs?[2] (No mention of the outcome! Confused canines?)



A steel needle, hollow and sharp, was developed by an Irishman, Francis Rynd, in 1844. The scene is increasingly international, with both French and Scottish input refining the needle design. Not mentioned thus far are two German doctors who also experimented, with injections into humans, that was back in the 1660's. That outcome is known..., people died.[2]



Glass syringes have been largely replaced by disposable plastic designs and our disposable needles have an exceedingly sharp point, reducing the "pain of having the Novocain." Latest developments include the Dental Wand and more recently an invention termed the Microneedle, a patch embodying 400 silicon based microscopic needles for delivery of medication through the skin with absolutely no pain.[2]

How apposite it is that the current issue carries two most relevant papers, one dealing with failure in achieving local anaesthesia, the second considering Conscious Sedation. Dentistry has always been a leader in anaesthesia, right from the days of Laughing Gas and Horace Wells. The delivery of dental care is a characteristically invasive process which has been made more comfortable and acceptable through a constant awareness of the need to ensure that it is less frightening and threatening. That this has been achieved is the

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message which should be emphasized again and again on March 20th. Patients should know that it is quite possible to Live Mouth Smart and to maintain high levels of Oral Health.

But should we admit that at least some of the reduction in pain is due ultimately to a snake?

References

1. Zahradnicek O, Biuchtova H, Tucker AS. The development of complex tooth shape in reptiles. Frontiers in Physiology 2014; 5:74.
2. Snelling. N. The history of the hypodermic needle. Lifestyle. 14th July, 2014.