in a mixture of proteins. A principal constituent should be identifiable because it dilutes a single one of the ^{15}N amino-acid thiohydantoin derivatives to the same extent at each stage of the degradative procedure. It will, of course, not be able to resolve several component proteins which are each present to the same extent. (*b*) Sequence studies on pure proteins available only in milligram quantities. At present, using a low resolution mass spectrometer, the method can detect at least 1 μg of the thiohydantoin derivative at each degradative step. (*c*) The quantitative study of the nature of amino-acid substitutions which are known to occur at certain loci in proteins such as haemoglobin and the immunoglobulins. To solve problems relating to the genetic mechanism by which variations are introduced into amino-acid sequences, it is necessary to have a quantitative method capable of analysing all amino-acids found at a single locus in a set of closely related proteins.

In addition the technique provides the basis for a rapid method for quantitatively identifying N-terminal groups in proteins of unknown compositions.

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Tooth Enamel of *Latimeria chalumnae* (Smith)

IT has been observed[1] that the formation of enamel in a small tooth germ of the crossopterygian, *Latimeria chalumnae*, is external to the dentine, and examination of more material has confirmed this impression. Serial sections through developing teeth, which had been stained as indicated in Table 1, showed quite clearly that the enamel matrix develops externally to the dentine (Fig. 1), and not as a change in the outer layer of the dentine that has already formed, as has been reported in actinopterygians by Kerr[2] and in some larval and adult amphibians[2,3].

Table 1

Stain	Dentine	Outer dentine (mesodermal enamel?)	Enamel matrix
Haematoxylin and eosin	Basophilic+	Basophilic++	Basophilic++++
Gomori	Brown	Brown	Unstained
Picromethyl blue	Green	Blue: dense, fibrous	Blue: amorphous
Alcian blue	Red	Purple	Very pale

A thin layer of dentine was seen in the initial stages of tooth development which subsequently showed changes similar to those described in the formation of mesodermal enamel[2–4]. On the outer side of this dentine, an amorphous matrix could be seen, forming after the initial dentine; it frequently becomes detached from the dentine surface, and may be lost in the preparation of the section. This matrix stained differently from the dentine proper and its outer layer, being very basophilic in haematoxylin and eosin staining but completely unstained by reticulin and collagen stains (Table 1). It is thus reminiscent of the enamel matrix of reptiles and mammals and can be considered an ectodermal tissue.

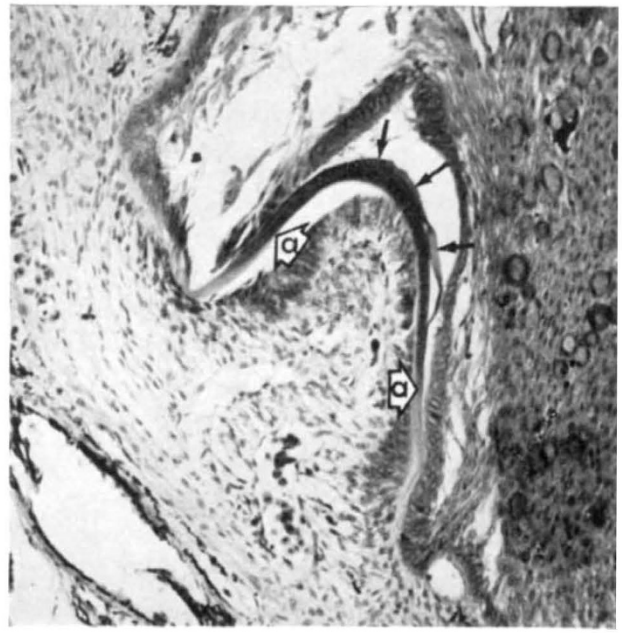

Fig. 1. Longitudinal section of tooth germ of *Latimeria chalumnae*. Note the early dentine (*a*). Ectodermal enamel matrix is visible (arrows) and in one place has become detached. Haematoxylin and eosin, × 100.

There is disagreement about the type of enamel found in the amphibia. Kvam[3,4] considers the tissue to be mesodermal in origin, while Kerr[2] and Soule[5] have shown that ectodermal enamel is formed. Kerr[2] reports, however, that in teeth of larval amphibia there is mesodermal enamel, although he does point out that the distinction may not be as significant as it first seems because the odontoblasts in the urodeles are of neural crest origin and so ectomesenchymal. There is no disagreement, however, about the enamel of teleosts and elasmobranchs being mesodermal.

That crossopterygian enamel should be ectodermal in origin shows that this tissue evolved very much earlier in the crossopterygian–tetrapod line of evolution than was at first thought. Palaeohistological investigation would indicate further at what time this tissue arose. Freshly and correctly fixed material for detailed histochemical and electron microscopic studies will shed further light on the problem.

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