MODE OF OCCURRENCE OF VITAMIN A IN SHARK LIVERS

WALD,[1,2] and Hecht, Chase, Shaler and Haig[3], have shown that vitamin A occurs in combination with protein in visual purple of the eye and plays an important rôle in the photochemical reactions accompanying the visual process. Lovern, Edisbury and Morton[4] have shown that on the extraction of oil from livers by non-polar solvents—to avoid denaturation of proteins—vitamin A may still be present partly in combination with protein and partly in oil solution. Working on the distribution of vitamins A_1 and A_2 in different coats of the intestinal tube, Lovern and Morton[5] concluded that the vitamin-protein complex may influence the transport of fatty acids from the intestines. Indirect evidence that vitamin A may partly occur as an integral part of liver tissue, has been observed during a comparative study of the processes of extraction of oil from shark livers. Shark liver containing 60 per cent. or more of oil was found to yield to the pressure exerted by its own weight a considerable quantity of oil on its keeping for a very short time after the removal of the liver from the shark. Two such individual samples of whole livers were selected for the experiments. The oil which oozed out was skimmed off and the liver treated with high pressure steam in specially fabricated steaming vats to extract the rest of the oil. The vitamin A potencies and a few chemical and physical characteristics of these fractions were then determined and compared. Vitamin A potency was assayed on the whole oil by the Carr-Price reaction using a B.D.H. pattern Lovibond Tintometer. The oil data were obtained by methods described before.[6]

Comparative data are presented in the table given below:—

TABLE I

Comparison of the two oils

Particulars	Sample I		Sample II	
Weight of liver	87 lbs.		82 lbs.	
Total weight of oil	62 lbs.		60 lbs.	
Percentage yield	71·3		74·5	
Sample of oil	Oozed out	Steam extracted	Oozed out	Steam extracted
Vitamin A potency Carr-Price Value	33·2	84·9	c. 1·0	16·9
Colour	Yellow	Orange	Yellow	Orange
Refractive Index, 35° C.	1·4623	1·4635	1·4653	1·4659
Acid Value, mgm. KOH/gm.	0·45	1·1	0·5	2·6
Saponification Value	154·4	155·6	168·6	172·0
Iodine Value: Wijs	78·54	83·71	102·3	100·2

The table shows that vitamin A does not occur wholly in oil solution in shark livers; It appears to be partly present as a complex with protein. This has some bearing on the conditions to be adopted during any oil extraction process.

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PYRETHRUM IN KASHMIR

PYRETHRUM has received considerable attention in India during recent years. Among the Provinces and Indian States who have taken up its cultivation, Kashmir leads with nearly 1,500 acres of land under Pyrethrum. A comparative study has been made of the pyrethrin content of the flower-heads collected from plantations situated at different altitudes during the past two years, to establish the optimum conditions for its collection, cultivation and drying under the local conditions. A large number of samples were collected from each individual plantation at different stages of blossoming of the flower-heads and assayed in this laboratory.

Results (Table I) indicate that the pyrethrin content tends to increase from the closed to the opened stage, but when the flowers are fully opened this percentage shows a decrease. This is obviously caused by the increase in the weight of the flower-heads which follows pollination and the subsequent formation of seed. This latter growth results in an increase of nearly 60 per cent. in the weight of flower-heads. Table I below details the results summarised above.

TABLE I

S. No.	Locality	Altitude (feet above sea-level)	Average weight of individual flower	State of Maturity	Total Pyrethrins per cent.
			Grams		
1	I	5000	0·086	Unopened	0·57
2	I	5000	0·108	Half opened	0·8
3		5000	0·161	Opened	0·9
4		5000	0·263	Fully opened	0·78
5	II	5500	0·094	Unopened	0·82
6		5500	0·108	Half opened	0·83
7		5500	0·180	Opened	0·92
8		5500	0·294	Fully opened	0·71
9	III	5500	0·086	Half opened	0·76
10		5500	0·125	Half opened	0·79
11		5500	0·195	Opened	0·91
12		5500	0·217	Fully opened	0·79

Altitude.—Table II indicates that whereas pyrehrins can profitably be cultivated at altitudes of 5,000 ft. to 8,000 ft. above sea-level, an altitude of 6,000 ft. represents the optimum height for the cultivation of this plant in Kashmir.

TABLE II

S. No.	1	2	3	4	5
Locality	I	II	III	IV	V
Altitudes feet above sea-level	5000	5500	6000	7000	8000
Total Pyrethrins of sun-dried samples per cent.	0·95	1·02	1·1	1·01	1·0

An interesting point is revealed in Table III with respect to the mode of drying. Sun-dried flower-heads show a higher pyrethrin percentage than those dried in the shade. This is due to the humid weather in Kashmir during the harvesting period when the flower-heads remain in contact with moisture for too long in shade and cause decomposition of the pyrethrins.

TABLE III

S. No.	1	2	3	4	5
Locality	I	II	III	IV	V
Pyrethrin contents of flowers dried under sun : per cent.	1·02	0·98	0·95	1·01	0·96
Pyrethrin contents of flowers dried in shade: per cent.	0·87	0·92	0·89	0·91	0·90

It has, however, been found that flower-heads dried partly in the sun for three days and subsequently in shade contain a higher percentage of the active principles. A detailed investigation of this is in hand.

AGE OF THE PLANTATION

An examination of the flower-heads in respect to the age of the plantation reveals (Table IV) a gradual fall in the active-principle content from year to year. This is probably due to the exhaustion of soil and investigation in connection with the soil conditions and manuring is progressing.

TABLE IV

Locality	I	II	III
Altitude (in feet above sea-level)	5000	5000	5500
Plantation age at the time of harvesting : years	4	3	2
Total pyrethrins or sun-dried samples : per cent.	0·95	0·96	1·02

Locality	Krewa Feth Garh	Brimel Lewar
Pyrethrin content : 1943 crop per cent.	0·9	0·92
Pyrethrin content : 1944 crop. per cent.	0·75	0·85

All the assays described above have been conducted by the method of Tattersfield and Hobson (*Drugs and Calenicals,* by Garratt, p. 259).

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THE OCCURRENCE OF A PSEUDOBRANCH IN THE FAMILY *OPHICEPHALIDAE* (TELEOSTOMI)

DURING the course of the study of the embryology of the food-fishes of Mysore, it was noticed that the head sections of the fry of *Ophicephalus gachua* (Ham.) disclosed the presence of a pseudobranch,—a structure which Day[1] described to be absent in the family Ophicephalidæ. In order to decide that it was not a larval feature, adults of *Ophicephalus* and *Channa* were dissected, where also a pseudobranch is now noticed to be present and, therefore, its disposition and vascular supply were studied. Further, it is proposed to describe in this note the arterial vessels of the head in *Ophicephalus* and *Channa,* since no account of the same is available for the former which is studied as a type of bony fishes in our colleges.

In the *Ophicephalus* fry (24 mm.), the pseudobranch is situated anterior to the branchial cavity and in a ventral dissection, it is noticed to be covered over partially by the adductor muscle extending between the pterygoquadrate and the parasphenoid. The orbital artery arising from the lateral dorsal aorta gives a branch to the pseudobranch which is its source of blood supply; the efferent pseudobranchial artery arises from the anterior end of it and goes off to the eye as the ophthalmica magna artery. A connection between the efferent pseudobranchial artery and ophthalmica magna artery with the arteria carotis interna is not noticed.

Adults of *Ophicephalus striatus* Bloch., *O. punctatus* Bloch., and *Channa orientalis* Bl. Schn., were examined. The pseudobranch situated far anteriorly to the branchial cavity is completely covered over by the adductor muscle. When the muscle is taken away, the pseudobranch, pink in colour, is seen in two parts: an oval anterior (Text-Fig. psb.) and a longish conical posterior with a medial protuberance (*psb'.*).

The vascular connexions of the pseudobranch in the adult *Ophicephalus* are different from those of the fry. In the adult, the carotid artery (ca.) arising from the united third and fourth efferent branchial arteries proceeds anteromedially to the auditory bulla (ab.) dorsally to the parasphenoid. It gives off a large orbital artery (ora.) (erroneously referred to as external carotid) and runs intracranially passing dorsally to the parasphenoid as before. The anteria carotis interna (aci.) now gives off a large orbitonasal artery (ona.) which passing dorsally to the parasphenoid emerges laterally near the pseudobranch and runs in the roof of the mouth to nasal region; a hypophysial