time for the pathological changes to develop in the unprotected eye. This is best illustrated by a correlation between mortality rate and incidence of eye lesions. For instance, on day 38, at a time when ocular changes were almost maximum, the relation was as indicated in Table II. It is also possible that the systemic blood pressure–which was not determined–was higher in group III than in group II; if this were the case, this may have contributed to a greater incidence of eye lesions in group III.

Discussion. It is evident that carotid ligation significantly protected the animals against some of the most serious complications of malignant hypertension. The protection seems to be due to the fact that by ligating the artery, the blood pressure could not rise in the head area following administration of DCA. Therefore, it is likely that the mere elevation in blood pressure plays a prominent role in the pathogenesis of vascular lesions found in the eye and the brain in malignant hypertension. It is too early to know what practical application could be made of such a treatment.

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Résumé

1° Un syndrome d'hypertension maligne a été reproduit chez le rat par l'administration d'acétate de désoxycorticostérone (DCA). Ce traitement produisit de l'artériolonécrose des vaisseaux de l'iris et du corps ciliaire, des hémorrhagies dans la chambre antérieure de l'œil ainsi que de l'œdème et des hémorrhagies cérébraux. 2° Ces lésions, oculaires et cérébrales, furent complètement prévenues par une ligature bilatérale de l'artère carotide primitive, probablement par suite d'une diminution de pression sanguine dans la région de la tête. Après une ligature unilatérale, l'œil homolatéral restait normal tandis que les lésions apparaissaient dans l'autre œil; de même, l'hémisphère cérébral homolatéral était normal alors que l'hémisphère contralatéral montrait un œdème marqué et de nombreuses hémorrhagies. 3° Le rôle pathogénique de l'hypertension *per se* est discuté brièvement.

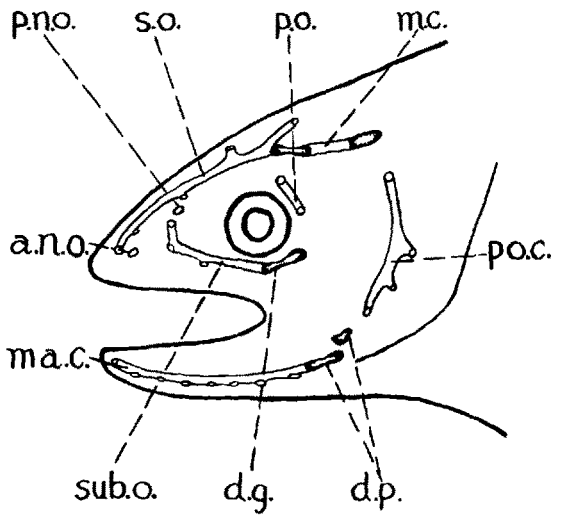
Sensory Canals of the Head in *Wallagonia attu* (Day)

All available descriptions of the sensory canals of the head in Siluroid fishes indicate a general pattern of their disposition. The author has, however, noted certain features in *Wallagonia attu* which differ from the types hitherto described and which appear exceptional. The following description of the distribution of the main canals is based on studies of specimens measuring 25 mm to 28 mm in length.

(1) The infra-orbital canal consists of (a) the sub-orbital, and (b) the post-orbital parts.

(a) The sub-orbital part starts with a pore below the posterior nasal opening, runs downwards for a short distance and then opens to the outside by a pore. The first sense organ is lodged in this region. Beyond this pore, it turns posteriorly and after running for some distance, communicates with the exterior by another pore. The second and third sense organs are located on either sides of this pore. Continuing further backwards below the eye, it finally passes over as an open dermal groove, until it loses its existence below the posterior limits of the orbit. The fourth and the last sense organ of the sub-orbital part is located in the region of the open dermal groove.

(b) The post-orbital part is a short canal, running obliquely behind the eye. It opens by two pores along its course and lodges one sense organ. There is no evidence, whatsoever, of any continuity between the sub-orbital and the post-orbital parts of the infra-orbital canal, or, between the latter and the supra-orbital canal.



Diagrammatic view of the head of a 28 mm long *Wallagonia attu*, showing the course of the sensory canals with their openings. *a.n.o.* anterior nasal opening; *d.g.* dermal groove; *d.p.* dermal pits; *ma. c.* mandibular canal; *m. c.* main canal; *po. c.* preopercular canal; *p.n.o.* posterior nasal opening; *p.o.* post-orbital part; *s.o.* supra-orbital canal; *sub.o.* sub-orbital part.

(2) The supra-orbital canal starts by a pore placed just anterior to and above the level of the anterior nasal tubular opening. It then takes a short oblique course dorsally and opens to the outside by a pore. The first sense organ is placed in this region. As it runs posteriorly, it gradually acquires a dorsal position and lodges three more sense organs. At its posterior extremity, it gives off a dorsal backwardly directed branch, which possesses one sense organ. After a short distance it opens and is subsequently lost.

The junction between the supra-orbital canal and the main canal of the head is marked by a large double pore. Beyond this point, a fully developed main canal is discernible, which lodges definite sense organs.

(3) The preoperculo-mandibular canal is also distinguishable into two parts -the mandibular and the preopercular, which are not continuous with each other. The mandibular part has eight pores and nine sense organs—the last two of which are situated in open dermal pits. Close to this point, a little dorsally, a pore leads into the preopercular canal, which at first runs obliquely along a postero-dorsal course, but soon turns abruptly in a dorso-vertical direction. Finally, it ends by a pore situated at some distance from the main canal. The preopercular canal possesses three sense organs in all and does not communicate with the main canal.

POLLARD[1], COLLINGE[2], and others, working on Siluroid fishes, state that the supra-orbital and infra-orbital canals join each other and then continue backwards as the main canal of the head. In a 30 mm long specimen of *Callichthys paleatus*, POLLARD[1] states that the infra-orbital canal runs almost in a continuous line with the supra-orbital, and even in a 25 mm long specimen of *Trichomycterus tenuis*, in which he regards the condition as larval, he found the two canals continuous. HERRICK[3], quoted by LEKANDER[4], also states that in a 25 mm long specimen of *Menidia*, the canals had assumed largely the same appearance as in the adult. But as is evident, such a condition has not been reached even upto the 28 mm stage of *Wallagonia attu*.

The preoperculo-mandibular canal in *Wallagonia attu* is also independent of the main canal at all the stages examined. Such a condition has also been figured in *Amiurus melas* by HERRICK[5], in *Callichthys littoralis* by COLLINGE[2], and in *Amiurus catus* by ALLIS[6] and WRIGHT[7]. Contradictory to the results of ALLIS[6] and WRIGHT[7], COLLINGE[2] maintains that in *Amiurus catus*, the 'opercular canal' is continuous with the main canal.

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Zusammenfassung

Das Studium der Sinneskanäle im Kopf des *Wallagonia attu* (Day) bis zu 28 mm Länge ergab, dass der präoperkulare Kanal sich nicht bis an den temporalen Hauptkanal erstreckt, dass der mandibulare Kanal sich nicht mit dem präoperkularen Kanal vereinigt und der infraorbitale Kanal nicht vollständig ausgebildet ist und sich nicht mit dem supraorbitalen vereinigt.

[1] H. B. POLLARD, Zool. Jb. *5*, 525 (1892).
[2] W. E. COLLINGE, Proc. zool. Soc. London *1895*, 274.
[3] C. J. HERRICK, J. comp. Neurol. *9*, 3 (1899).
[4] B. LEKANDER, Acta zool. *30*, 1 (1949).
[5] C. J. HERRICK, J. comp. Neurol. *11*, 177 (1901).
[6] E. P. ALLIS, J. Morph. *2*, 463 (1889).
[7] R. R. WRIGHT, Proc. Canad. Inst. [n.s] *2*, 251 (1884).

DISPUTANDUM

The Heat of the Reaction *trans*→*cis* $[Coen_2Cl_2]^+$ in Aqueous Solution

HAWORTH, NEUZIL, and KITTSLEY[1] have recently investigated the equilibrium

$$trans\text{-}[Coen_2Cl_2]^+ \rightleftarrows cis\text{-}[Coen_2Cl_2]^+$$

in solution by a spectrophotometric method, and from the temperature dependence of the equilibrium constant they have found ΔH over the temperature range 1–36° to be + 31·4 kcal. If this result were correct, it would be of the greatest interest, since it implies that bond strengths in the two isomers are widely different. Investigation of the infra-red spectra of *cis*- and *trans*-bischlorobisethylenediamine cobaltic chlorides from 450 to 3500 cm^{-1} does not support this conclusion; corresponding bands differ nowhere by more than a few wavenumbers. In the 500 cm^{-1} region, where Co–N vibration frequencies should be found[2], the observed frequencies are: *cis*-compound, 575, 507, and 457 cm^{-1}; *trans*-compound, 585, 512, and 470 cm^{-1}. These figures suggest very little difference in bond strengths. Furthermore, published data[3] for the heats of solution and of decomposition by aqueous sodium sulphide of both isomers lead to a value of + 1·8 kcal.

We are therefore driven to conclude that HAWORTH *et al.* have misinterpreted their spectral data, and that, as would be expected, the isomers differ in energy by only a very small amount.

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University Chemical Laboratory, Cambridge, January 30, 1957.

Zusammenfassung

Es wird gezeigt, dass der veröffentlichte Wert von $\Delta H = + 31{,}4$ kcal für die Reaktion *trans* → *cis*-$[Coen_2Cl_2]^+$ion in wässeriger Lösung zu hoch ist. Der richtige Wert ist + 1,8 kcal.

[2] D. B. POWELL and N. SHEPPARD, J. chem. Soc. *1956*, 3108.
[3] T. C. J. OVENSTON and H. TERREY, J. chem. Soc. *1936*, 1660.

The Heat of the Reaction *trans*→*cis* $[Coen_2Cl_2]^+$ in Aqueous Solution

A Reply

SHARPE and WAKEFIELD have criticized the value of 31·4 kcal[1] (obtained from the temperature dependence of the equilibrium constant) for the reaction

$$trans\text{-}[Co(en)Cl_2]^+ \rightleftarrows cis\text{-}[Co(en)_2Cl_2]^+$$

as being inconsistent with their interpretation of the infra-red spectra of these species. However, the following equilibria probably exist in aqueous solution[2]

$$cis\text{- and } trans\text{-}[Co(en)_2Cl_2]^+ \rightleftarrows [Co(en)_2(H_2O)Cl]^{++} \rightleftarrows [Co(en)_2(H_2O)_2]^{+++}.$$

Furthermore, there is evidence[2] that the interconversion actually occurs via the $[Co(en)_2(H_2O)Cl]^{++}$ ions instead of the dichloro complexes. Thus, the observed temperature dependence of the equilibrium constant may be due to the aquation reaction rather than differences in bond strengths in the two isomers.

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Department of Chemistry, Marquette University, Milwaukee (Wisconsin), August 29, 1957.

[1] D. T. HAWORTH, E. F. NEUZIL, and S. L. KITTSLEY, Exper. *12*, 335 (1956).
[2] J. C. BAILAR, *Chemistry of the Coordination Compounds* (Reinhold Publishing Corporation, New York 1956), p. 301.

[1] D. T. HAWORTH, E. F. NEUZIL, and S. L. KITTSLEY, Exper. *12*, 335 (1956).