tions of different concentrations and recording graphically the effect upon breathing and arterial pressure. Intravenous injections of 0.5 ml. of 0.1 and 0.2 per cent solutions of anibine reduced slightly the arterial pressure. Higher doses (1 ml. of 2 per cent solution of anibine) produced a marked analeptic effect on animals the respiratory centres of which had been previously depressed by morphine (Fig. 1). Blank tests in which only the diluents, at the same pH, were injected failed to affect respiration.

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Indole-3-aldehyde from Tissues

Salhanick and Berliner¹ studied a feminizing adrenal tumour from a man of 22. It weighed 920 gm., of which 523 gm. were used for chemical extraction. The frozen tissue was homogenized and extracted with acetone, leaving a 'protein' residue. The aqueous acetone was extracted with chloroform and the resulting lipid was partitioned between hexane and 75 per cent methanol. The latter was reduced to small bulk and extracted with chloroform to yield 0.67 gm. of yellow oil. The protein residue was digested with alkali (1 l. 5 per cent sodium hydroxide) for two days and extracted first with ether at pH 10 and then at pH 3 after acidification. After partitioning the extract, 0.26 gm. of oil was obtained. Chromatography on silica gel yielded progesterone, equilenin and two unidentified materials designated *AAE-I-BI* (44 µgm.) and *AAE-I-AI* (23 µgm.) from the acetone extract. From the protein hydrolysate extract the same materials were obtained in somewhat larger amounts (*AAE-I-AI*, 109 µgm.) together with three further unidentified fractions.

Substance *AAE-I-AI* showed (in methanol) absorption peaks at 242, 260 and 295 mµ and in concentrated sulphuric acid peaks at 240, 265 and 330 mµ. The published absorption curves show well-marked patterns of maxima and minima. The preparation exhibited a positive Millon test, regarded as indicative of a 3:5-unsubstituted hydroxyphenyl group; it also gave a positive Zimmermann reaction for 17-ketosteroid. The total amount of material (132 µgm.) was very small, and there was no evidence as to purity. It was uncertain whether the chemical tests and the spectrophotometric characteristics were due to a single compound.

There can now, however, be little doubt that the spectroscopically recognizable constituent of *AAE-I-AI* was indole-3-aldehyde (Table 1) or a chromophorically identical substance.

The most surprising feature of the properties of the aldehyde is the change in absorption spectra in the presence of alkali.

The indole nucleus shows an intense absorption band near 220–225 mµ and a region of weaker

Table 1. PROPERTIES OF INDOLE-3-ALDEHYDE (FORMYLINDOLE)

Solvent*	$\lambda_{\max.}$ (mµ)	$\epsilon_{\max.}$	$\lambda_{\min.}$ (mµ)	$\epsilon_{\min.}$
Ethanol	242	13,700	227	4,700
	260	11,700	252	11,000
	296	13,440	272	7,200
Ethanol sodium ethoxide (0.1 M)	266	19,900	237	2,500
	326	20,400	293	5,850
Concentrated sulphuric acid	235	28,800	220	17,900
	266	54,200	250	28,700
	329	46,700	285	10,100

* See also G. F. Smith (ref. 2) for aqueous and aqueous alkaline solutions.

selective absorption around 270–280 mµ (order 10,000) with some fine structure. This applies to indole, 2-methyl-, 3-methyl- and 7-methyl-indole as well as to indole-3-acetic acid and tryptophan. Addition of sodium ethoxide to ethanolic solutions effects no marked change.

The new effect with indole-3-aldehyde has been attributed to the change:

In fact, we have found that there is an equilibrium which varies with the pH.

Indole-3-aldehyde has also been shown³ to be one of the photochemical products of the irradiation of indole-3-acetic acid with light of wave-length 280 mµ.

In the course of an extended study of tissue unsaponifiable fractions we have noted a material (fraction *SF*) showing $\lambda_{\max.}$ 235 and 282 mµ (in cyclohexane) and $\lambda_{\max.}$ 242 and 295 mµ (inflexion 260 mµ in ethanol). Among the best sources of this material were pancreas and spleen from several species. By chromatography on alumina the *E*(1 per cent, 1 cm., 282 mµ) value was raised to 50 and at that stage a small quantity was subjected to molecular distillation and yielded a few mgm. of white crystals. The absorption curves for this preparation in ethanol and in sulphuric acid reproduced those of *AAE-I-AI* but the chemical constitution remained unknown. The crystals gave a negative Millon reaction and a positive Tollens reaction. Small amounts of molecular distillates were kindly examined for us in the mass spectrograph at the Thornton Research Laboratories of Shell, Ltd. Mr. A. Quayle and his colleagues (to whom we are much indebted) found in the purer preparation evidence that the largest particles were of mass number (molecular weight) 144 and 145 and with nitrogen present it was suggested that an indole derivative was possible. Examination of authentic indole-3-aldehyde soon confirmed the nature of the selectively absorbing substance. It is perhaps too early to discuss in detail the significance of the detection of indole-3-aldehyde in the adrenal tumour, in normal pancreas and spleen and in the photo-products of indole-3-acetic acid. The idea that it is a straightforward artefact derived from the tryptophan of proteins is not consistent with the evidence.

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