

noch Pentobarbital erhalten hatten, der Schwellenwert für das Kältezittern bei 33,0°C lag (Tabelle).

Diese Befunde zeigen, dass Pethidin das Kältezittern unterdrückt, was auch mit der klinischen Erfahrung übereinstimmt (CORELLI)¹. Die Wirkung des Pethidins lässt sich durch Pentobarbital steigern. Dabei handelt es sich jedoch nicht lediglich um eine Addition der Wirkungen beider Stoffe, sondern um einen überadditiven Effekt.

Summary. In rats, shivering was induced by cooling. Shivering started at 36.6°C in unanaesthetized rats and at 36.0°C in animals with light pentobarbital anaesthesia (5 mg/kg i.v.). Pethidine (2 mg/kg) lowered the onset of

shivering in unanaesthetized rats to 35.3°C and in anaesthetized animals to 33.0°C. The results suggest that the effect of pethidine upon shivering is potentiated by pentobarbital.

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27. Januar 1966.*

¹ F. CORELLI, Policlinico, Sez. pratica 48, 1747 (1941).

Surface Microscopy of the Large Bowel

In the present paper, some preliminary results of colonic surface microscopy are reported. These have been assessed on human colic mucosa specimens prepared from surgical or bioptic material. The biopsies were performed by aspiration from every portion of the colon according to a technical procedure set up by ourselves, or from the lower 30 cm during rectosigmoidoscopy by means of rectal forceps.

Methods. 59 bioptic specimens have been studied; 30 of which were obtained during rectosigmoidoscopy and 29 by aspiration after end-to-end intubation. 10 additional specimens were derived from surgical material. The aspirative biopsy procedure has been described elsewhere¹. The specimens were obtained from 42 subjects of both sexes; of which 10 were free from digestive troubles and 32 showed signs of different colonic disorders (non-specific ulcerative colitis, colonic carcinoma etc.). The histological sections for the surface microscopy were studied by means of an Ultropak Leitz apparatus, using UO 6.5, UO II, UO 22 and UO 55 lenses; as a rule, the UO II lens has been employed with its immersion set. Microphotographs were obtained with a Periplan × 8 ocular from fresh or 10% formalin fixed specimens, employing high contrast positives and negatives.

Results. (1) Normal subjects: In the histological patterns of the colonic mucosa of these subjects, two different features can be observed. The first one shows a *flat surface* on which the openings of the mucous glands appear clearly shaped and located at intervals varying from 110–250 μ. These openings are visible at the bottom of small depressions and give rise to thin radial strings corresponding to scanty folds. The openings are round shaped or appear as

thin clefts; their diameter usually varying from 10–30 μ. This picture is comparable to the one in the classical anatomical literature² (Figure 1a).

The second feature shows *papillary-like folds*, uniformly disseminated and almost similar in size, with a diameter of about 100 μ (Figure 2). At the very top of each fold, the opening of the mucous gland can be observed. Among the papillary folds there is a round or polygonal figure which is caused by the capillaries of the vascular layer of the mucosa³. This figure may also be noted in preparations having the flat aspect.

One might suggest the papillary pattern to be a consequence of an autoplasmic process, deriving from activity of the 'muscularis mucosae'. The contraction of the latter might cause the straightening of the papillae and the dilatation of the peripapillary superficial blood vessels. The autoplasmic process could physiologically affect the secretion as well as the reabsorption activity of the mucosa.

¹ C. COLAGRANDE and P. ARULLANI, *Archo ital. M. appl. Dig.* 37, 369 (1964).

² A. A. MAXIMOW and W. BLOOM, in *A Textbook of Histology* (Ed., W. B. Saunders Company, Philadelphia and London 1957).

³ V. L. GIACOMELLI, *Atti Soc. ital. Cancer.* 59, 76 (1959).

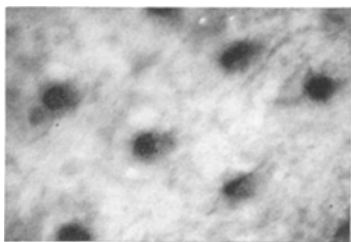


Fig. 1a. Normal left colon. Mucous surface: several openings of the mucous glands can be observed on the flat background. × 200.

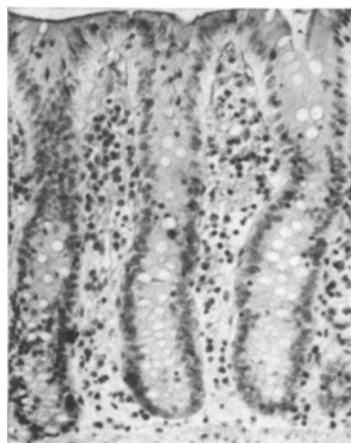


Fig. 1b. Histological pattern from the same specimens: note the small openings of the glands. × 200.

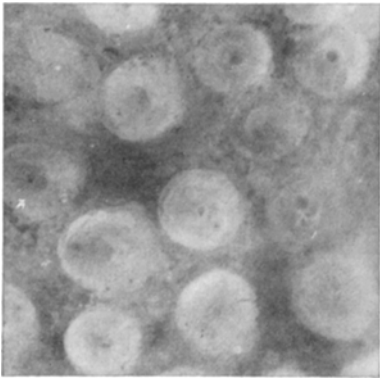


Fig. 2. Normal sigma. Mucous surface: papillary-like folds, almost uniform in size. At the top of each fold, the opening of the mucous gland can be observed. $\times 200$.

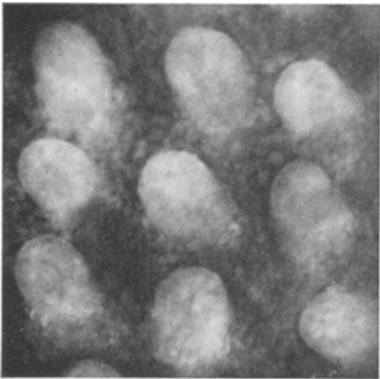
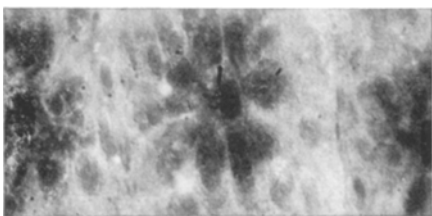
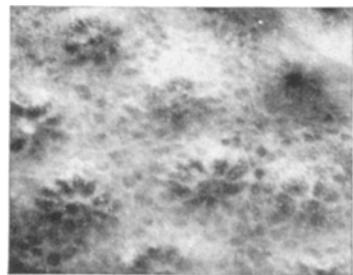


Fig. 3. Normal right colon. Submucous surface: finger-like figures, which correspond to the terminal part of the mucous glands. $\times 250$.



Figs. 4a and 4b. Mucous diarrhoea. Left colon. Mucous surface: small translucent areas, corresponding to the mucous cells. a, $\times 150$; b, $\times 250$.

From all the aspirative biopsy specimens, microphotographs of the surface opposite to the mucosal one were obtained. Some very characteristic figures may be observed which have a finger-like or pseudovillous aspect, given by the terminal parts of the mucous glands (Figure 3).

(2) Subjects with signs of colonic involvement or with neoplasms of the colon: A first finding, observed in subjects suffering from mucous diarrhoea, is a scanty waving of the mucosa due to small translucent areas closely connected to each other (Figure 4a, b). Such areas correspond to the goblet cells, clearly shaped in the usual histological sections (Figure 4c). In the same patients a second feature is observed; that is the irregular shape of the gland openings, which are of remarkable size (up to $80\text{--}100\ \mu$) (Figure 5a).

The third feature is given by the irregular aspects of mucous surface. This has been found in a patient affected by ulcerative colitis and in a case of colonic carcinoma. In

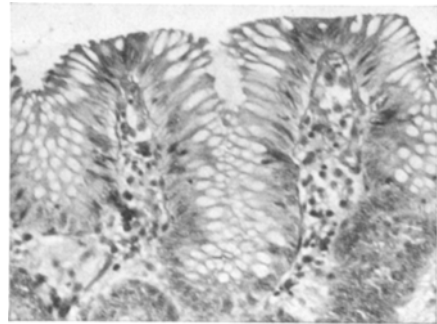


Fig. 4c. Histological pattern from the same specimen. $\times 250$.

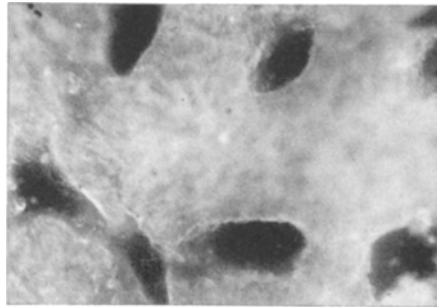


Fig. 5a. Mucous diarrhoea. Left colon. Mucous surface: large, irregular openings of the mucous glands. $\times 250$.

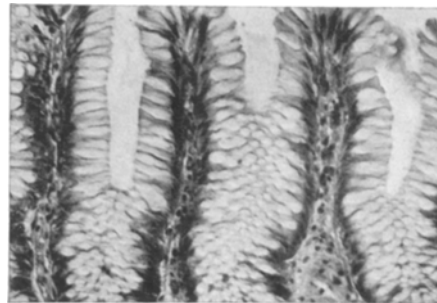


Fig. 5b. Histological pattern of the same specimen. A large number of goblet cells can be observed. $\times 250$.

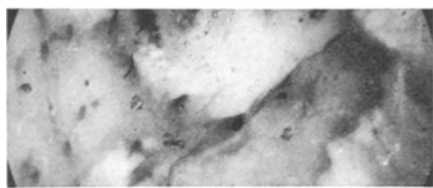


Fig. 6a. Recovering ulcerative colitis. Left colon. Mucous surface: wide depressed areas and roughness of the surface; several gland openings can be observed. $\times 50$.



Fig. 6b. Histological pattern of the same specimen showing the wave-like aspect of the mucous surface. $\times 50$.

the former we observed wide depressed areas and roughness of the surface, varying in size and clear-cut on the surrounding areas. At the bottom of these, the gland openings appear often altered and irregularly scattered (Figure 6a). In a case of adeno-carcinoma, the surface specimens showed a grossly alveolar picture formed by depressions and by large interconnecting folds. The depressed areas seemed to correspond to irregular and enlarged openings of the glands.

These preliminary data seem to show the suitability of the surface microscopy in the study of the colon. They provide a number of pictures which probably represent either structural or functional aspects concerned with the activity of the muscularis mucosae. It is also possible that they permit a better comparison between the histological and radiological picture⁴.

Riassunto. La microscopia di superficie costituisce una integrazione dell'istologia convenzionale. È possibile che essa sveli anche aspetti utili per lo studio dei momenti funzionali della mucosa.

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August 12, 1965.*

⁴ Aided by grants from Consiglio Nazionale delle Ricerche (CNR).

Pharmacological Properties of Neurones of the Paramedian Reticular Nucleus

The paramedian reticular nucleus (n.r.p.) has been identified by anatomical techniques as a cerebellar projecting reticular nucleus of the medulla^{1,2}. In the course of experiments on cholinceptive neurones in the cat brain stem³ it became apparent that a group of neurones in the same region as n.r.p. were consistently excited by acetylcholine. Accordingly, experiments were made to determine responses of n.r.p. neurones to iontophoretically applied drugs.

Cats were decerebrated under halothane anaesthesia and the cerebellum was removed to expose the floor of the IVth ventricle. Bipolar stimulating electrodes were inserted into one cerebellar peduncle and four- or five-barrelled glass micropipettes were inserted through the floor of the IVth ventricle. Recordings were made from single neurones and drugs were expelled with currents of 50–100 nA.

When penetrations were made between 1.0 and 3.5 mm rostral to the obex and between 0.4 and 1.2 mm lateral to the mid-line, many neurones were found which gave an antidromic response to stimulation of the ipsilateral cerebellar peduncle, the latency on most occasions being between 0.6 and 1.6 msec. These neurones were presumed to belong to n.r.p.

The effect of drugs on the spontaneous activity of these neurones was examined. Acetylcholine was applied to 42 and of these it excited 39 and left 3 unaffected; this response could be blocked by application of gallamine from another barrel of the micropipette. Noradrenalin

was applied to 19 of which it inhibited 17, 2 being unaffected, and 5-hydroxytryptamine, applied to 20 excited 16, inhibited 1 and left 3 unaffected. Thus, with a few exceptions these neurones are of one pharmacological type, being excited by acetylcholine, inhibited by noradrenalin and excited by 5-hydroxytryptamine. In this respect they differ from a random sample of brain stem neurones since these show a wide variety in their responses to acetylcholine, noradrenalin and 5-HT⁴.

Thus, from these results it appears that uniformity of function may be associated with some degree of uniformity of pharmacological properties in brain stem neurones.

Zusammenfassung. Die chemische Sensitivität von Neuronen des Nucleus reticularis paramedianus mit cerebellärer Projektion wurde iontophoretisch untersucht. Die Mehrzahl der Neurone werden erregt durch Acetylcholin und 5-HT, dagegen gehemmt durch Noradrenalin.

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