CHOLINESTERASE

IN SCIENCE for August 27, 1943 (98: 2539, 201) occurs an interesting article by Mendel and Rudney, concerning cholinesterase. The authors refer to the existence of two esterases capable of hydrolyzing acetylcholine, but cite as first publication of this fact their article in the *Biochemical Journal* (37: 59, 1943). The existence of these two esterases was thoroughly demonstrated and reported by G. A. Alles and R. C. Hawes in the *Journal of Biological Chemistry* (133: 2, 375, April, 1940), also by R. C. Hawes and G. A. Alles in the *Journal of Laboratory and Clinical Medicine* (26: 5, 845, February, 1941).

Mendel and Rudney refer to one of these esterases as "pseudo-cholinesterase." This seems an unfortunate designation, since most of the published references to cholinesterase probably refer to the one receiving the prefix "pseudo." It would be helpful to biologists if the authors would select some other nomenclature for discriminating between the two.

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A FEW WORDS ON RUSSIAN NAMES

I HAVE followed with great interest the discussion of transliterating Russian names by Drs. Hrdlička (SCIENCE, 97: 243), Dunlop (*ibid.*, 97: 400) and Chester (*ibid.*, 98: 302).

My long experience in library and bibliographical work has led me to the conclusion that the basic trouble in transliteration of Russian names is the lack of uniformity in such work. This could easily be avoided if the rules of the Library of Congress were strictly followed. In fact, they are often ignored even in library practise.

In one library I found the papers of the well-known Russian botanist "Кузнецов" (Kuznetsov) scattered in five places in the catalogue, but at least they all were under the letter "K." Much worse was the case of another botanist "Железнов" (Zheleznov), whose works were under "G," "J" and "Z." But I never saw a more extravagant use (or misuse) of the English alphabet than in the transliteration of the name of "Щеглеев" (Shchegleev) in which the first Russian letter was represented by the craziest combination of 7 English letters. After that experience I can only smile when K. Starr Chester says that "shch" is a rather clumsy equivalent for that letter.

The above cited examples show to what extent some transliterators may go if they do not adhere to a certain definite standard.

The rules of the Library of Congress are certainly not perfect, and I concur with K. S. Chester that "ya" is better than "i͡a" for "я" and "yu" is preferable to "i͡u" for "ю." On the other hand I disagree with him that "ch" is equivalent for "ц"; it is probably a misprint for "ч." I could recommend some minor improvements, as using "ë" for Russian "e" in order to distinguish it from "э." The Library of Congress uses "e" for both letters.

But, in all, the rules of the Library of Congress are quite satisfactory, even in the present form, and the strict use of them will bring uniformity in the transliteration of Russian words and benefit greatly all persons engaged in research work on Russian literature.

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SCIENTIFIC BOOKS

HUMAN GASTRIC FUNCTION

Human Gastric Function: An Experimental Study of a Man and His Stomach. By STEWART WOLF, M.D., and HAROLD G. WOLFF, M.D., with a foreword by WALTER B. CANNON, M.D. 195 pages, including appendix, bibliography, index and 42 illustrations, one in color. New York: Oxford University Press.

As Dr. Cannon points out in the foreword there have been in the United States two previous famous studies of the human stomach made in individuals with gastric fistulae: Dr. William Beaumont's classic report of his experiments and observations on Alexis St. Martin and Dr. Anton J. Carlson's extensive work with Fred V. Beaumont concerned himself primarily with the digestive function of the gastric juice, Carlson with gastric motility, particularly "hunger contractions." The present monograph is a complete report of studies made in a patient, Tom, with a gastric fistula similar to that of St. Martin and Fred V. Some of the work has been published previously elsewhere. It is not entirely new, but it is meticulously thorough. It differs from the earlier studies primarily in its broader orientation, being a study of both the "man and his stomach." As the authors note in their introduction an investigator's horizon is usually limited by the vantage point on which he stands, the vantage points being the prevailing concepts of his day, and few men have been able to look beyond the horizon of their generation. Wolf and Wolff have been quick to sense the implications for gastric physiology of the old mind-body problem now returning to style as psychosomatic medicine and to subject

it to scientific study. The work was well planned, brilliantly executed and conservatively appraised. It deserves to rank with the classic studies of Beaumont and of Carlson as a milestone on the road to a better understanding of gastric function and disease.

The description of the appearance and behavior of a stomach after forty-seven years of feeding through a gastric fistula is important because of the normality found. The authors found that gastric vascularity as measured by variations in color (Munsell method) reflected changes in blood flow. Simultaneous observation on gastric vascularity, motility and secretion disclosed that hyperemia always accompanied increased parietal cell output. The stomach emptied only during periods of vigorous contractions. The introduction of fluid into the stomach or duodenum inhibited gastric contractions, the duration of the inhibition varying with the quantity and nature of the fluid and the time of its introduction. The rate of parietal cell output was estimated under a variety of conditions. Exposure to cold (environmental), the application of ice bags locally and irrigation of the stomach with cold water inhibited gastric motility and parietal cell secretion and produced pallor. With returning warmth the mucosa became redder, the motility grew more active and the secretion increased. Tobacco smoking produced no definite effect as long as it was a pleasurable experience. Nausea induced by any method was uniformly accompanied by mucosal pallor, hypomotility and hypoacidity. The introduction of acid (20 cc of 0.1 or 0.34 N HCl) into the stomach inhibited motility and parietal cell secretion and increased the secretion of mucus. Antacids (sodium bicarbonate, calcium carbonate, magnesium oxide, aluminum hydroxide) exerted no measurable effect on secretion. Nitrites (amyl nitrite, nitroglycerine) inhibited gastric motility and tone. In general, drugs producing flushing or pallor of the face tended to produce flushing or pallor of the gastric mucosa also. Atropine inhibited both gastric motility and secretion.

As a basis for a study of the "situational factors," the correlation of gastric function with the behavior of the individual as a whole, the authors present a comprehensive and skilful analysis of the background and personality of Tom whose emotional and social development had been profoundly influenced by a difficult family life in childhood and the accident at the age of 9. The gastrostomy prevented him from eating with the family, friends or strangers, thus accentuating his feelings of inadequacy and tending to develop shyness and suspicion. He was not given to fantasy. On the whole his adjustment to life was adequate in spite of the handicap.

In studying the effect of emotions upon gastric function the authors did not use experimentally induced situations but rather utilized the spontaneously occurring conflicts and problems. Thus the stomach was found to respond to stimulation of the appetite with increased vascularity and secretion. Fear produced pallor and inhibited secretion as did sadness and self-reproach. On the other hand, when the subject came to the laboratory "bursting with resentment," the gastric mucous membrane was "turgid, engorged, much redder than usual," the level of secretion "in terms of volume, acidity, and parietal cell output was three times normal"; gastric activity was accelerated. During two weeks of sustained anxiety and chronic emotional conflict the mucosa was continuously engorged and reddened, measuring 70 per cent. on the color scale compared with 56 per cent. for the preceding two weeks and 50 per cent. for the two weeks after the emotional stress had been relieved by an increase in pay. The average thirty-minute fasting gastric secretion was 3.6 cc for the initial control period, 5.5 cc for the two weeks of conflict and 3.0 cc for the second control period. Flight or withdrawal reactions seemed to be accompanied by a depression of gastric function, whereas the unfulfilled desire for aggression and fighting back was accompanied by increased vascularity, motility and secretion.

With regard to sensation it was found that heartburn resulted from stimulation of the mucosa lining the cardiac end of the esophagus. Touch sensation was absent in the gastric mucosa, whereas pressure sensation was appreciated and roughly localized. Temperatures above 40° C. were appreciated as heat, those below 18° C. as cold, those between not felt. Pain could not be elicited by stimulation of the normal mucosa, whereas when vascular engorgement, inflammation and oedema were present minor stimuli caused pain, indicating a lowering of the threshold. Sudden distension of the muscular and peritoneal coats and unusually vigorous contractions both produced pain. The threshold for pain varied with the condition of the tissues and was lowered by vascular engorgement, inflammation and oedema.

The undue and prolonged acceleration of acid secretion in the stomach resulted in a hyperemia and engorgement of the mucous membrane resembling the gastroscopic picture designated as hypertrophic gastritis. Trifling traumata to the mucosa in this state resulted in hemorrhages and small erosions. Ordinarily the mucosa was protected by an effective coating of mucus. With loss of this protection minor injuries led to oedema, inflammatory changes, erosions and hemorrhages. The contact of acid gastric juice with a denuded surface induced further hyperemia and acceleration of gastric secretion. Prolonged contact

of acid gastric juice with a minor erosion resulted in the formation of a peptic ulcer. The application of strong acid to the inflamed and eroded mucosa did not produce pain, although it might have done so with more intense inflammation and a further lowering of the pain threshold.

In the final formulation of the work with its clinical implications the authors consider the objective in the management of patients with gastritis and ulcer to be clearly that of preventing or controlling gastric hyperfunction, the problem thus resolving itself into the care of the man rather than his stomach. "It is to be hoped that factors of emotional conflict, on the one hand, and security on the other will be more directly dealt with in the future. . . . Dealing actively with the patient's life situation and his reactions to it may then be adequately judged as a means for the control of 'dyspepsia,' gastritis and peptic ulcer." The reviewer does not question the importance of this approach, but he is not persuaded that adequate care of the diseased stomach can be regularly accomplished thereby. Complete emotional tranquility often seems a utopian dream rather than a possible achievement in a real world with its inevitable problems, frustrations and insecurities. Nevertheless dreams may provide goals. The authors have established relationships and mechanisms; they have indeed pointed beyond the horizon.

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SPECIAL ARTICLES

TRANSMISSION TO RODENTS OF LANSING TYPE POLIOMYELITIS VIRUS ORIGINATING IN THE MIDDLE EAST[1]

DURING 1941–42 a number of cases diagnosed as poliomyelitis or encephalitis were reported[2] in the Middle East Forces of the British Army. Other neurological syndromes observed among the troops in the same area at that time were tentatively designated as "lymphocytic choriomeningitis," "polioencephalitis," "brachial neuritis," "wasting" of various groups of muscles. A number of specimens derived from these cases were made available to us for investigation.[3]

The materials consisted of fragments of human and monkey spinal cord and brain, immersed in glycerolated saline solution, and many of them had been in transit for several weeks at different seasons of the year. The monkey tissues were from Abyssinian grivets and baboons (*C. griseoviridis* and *P. hamadryas*) which had developed paralysis after inoculation of human materials by Major Van Rooyen.

Transfers to monkeys: Of tissue specimens derived from seven cases, three proved to be infectious for *rhesus* monkeys.

(a) Strain MEF1: The material received was labeled "monkey and baboon cords, 1st passage." Bacterial culture yielded no growth; intracerebral inoculation of a 10 per cent. suspension in broth into rabbits, guinea pigs and mice, and injection into embryonated eggs gave negative results. Intracerebral inoculation into two monkeys led to characteristic flaccid paralysis on the 12th day in one, while the other one was sacrificed on the 9th day when showing tremor and weakness of the hind limbs. Typical lesions of experimental poliomyelitis were present in the spinal cord and brain of this animal. Nevertheless, four monkeys inoculated with a suspension of this cord remained well.

A second isolation of virus from the original material was made and this time the virus could be maintained through another passage. Two monkeys inoculated with a mixture of the original material and pooled poliomyelitis (MV and Philadelphia strains) monkey antiserum remained well.

(b) Strain MEF2: The specimen received was baboon cord. Culture yielded no bacterial growth. Transfer into mice, rabbits, guinea pigs and chick embryos failed. Two monkeys, inoculated intracerebrally with a 10 per cent. suspension in broth, developed characteristic paralysis and in one instance histological study revealed typical poliomyelitic lesions. In the same test, one monkey paralyzed following infection with Strain MEF1 remained unaffected by Strain MEF2, while a second one which, after injection of Strain MEF1, had had only fever for 5 days, came down with quadriplegia. A mixture of virus and anti-MV-Philadelphia-poliomyelitis monkey serum was injected into two monkeys. One of these developed paralytic poliomyelitis, while the other one may have had an abortive attack (fever and weakness on the 6th day after inoculation).

(c) Strain MEF6: The original material was human cord tissue heavily contaminated with bacteria. All

[1] This investigation was made in collaboration with the Commission on Neurotropic Virus Diseases, Board for the Investigation and Control of Influenza and Other Epidemic Diseases in the Army.

[2] C. E. Van Rooyen and A. D. Morgan (in press).

[3] Numerous human sera and specimens of nervous tissues were sent by Major C. E. Van Rooyen, R.A.M.C., to Captain T. M. Rivers, M.C., U.S.N.R., whose guidance and encouragement made this work possible. We also wish to thank Major Van Rooyen for his enthusiastic cooperation under difficult conditions, and Colonel J. S. K. Boyd, R.A.M.C., for his gracious permission to publish the results here presented.