may not return for several months. This, together with the fact that adults frequently suffer severe pain immediately following treatment, suggests that these differences may be explained on an anatomic basis. In adults, the superior meatus is narrower than in children,[2] it may indeed be narrow and deep enough to contribute materially to capillary attraction. This would result in the solution being held in contact with the mucosa for a longer period of time and thus add not only to the discomfort, but also to the duration of chemical action on the cells. The question of the possible risk of inducing permanent anosmia by such more prolonged and uncontrolled drug action will not be discussed here; nevertheless, it is of considerable theoretical interest that a few cases in adults are known to us in whom the sense of smell has been completely, or nearly completely regained after an anosmia lasting 2 to 4 months. This is in harmony with our observation that treated monkeys generally become susceptible again to intranasal inoculation of virus within 2 to 4 months after treatment. This raises the question, what is the mechanism underlying these late restorations of function in man and of susceptibility to infection in monkeys?

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Listerella Monocytogenes: A Cause of Meningo-Encephalitis in Man.

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In a preliminary note[1] we reported the isolation from a human case of meningo-encephalitis of a new organism which we identified with the genus Corynebacterium. We wish at this tme to report additional observations and to correct the classification of the organism.

The clinical history of the case is described in the preliminary note and has been more fully presented by Marcellus, Crouch and

[2] Shahinian, L., Bacher, J. A., McNaught, R. C., and Newell, R. R., *J. Am. Med. Assn.*, 1938, **110**, 1254.

[1] Schultz, E. W., Terry, M. C., Brice, A. T., and Gebhardt, L. P., PROC. SOC. EXP. BIOL. AND MED., 1934, **31**, 1021.

Terry.[2] A noteworthy fact is that the organism was cultured from the spinal fluid of this patient 12 times over a period of nearly 4 months, though the period of acute illness lasted less than 2 weeks.

A month after our report, Burn[3] in Connecticut reported the isolation of a similar organism from 3 fatal cases of meningo-encephalitis in infants. Later,[4] he reported a fourth fatal case, this time in an adult, and identified his strains with the genus Listerella. In this paper he refers also to a case reported to him by Dr. W. Allen of Hartford, Connecticut. From a fatal case of meningitis in a human adult in Scotland, Gibson[5] isolated an organism which he thought belonged to the genus Corynebacterium. Morphologically and culturally the organism resembled our strain. In Norway, Tesdal[6] described a case of fatal meningitis in man "caused by a Corynebacterium." His description of the organism, however, suggests a Listerella. More recently Carey[7] in Massachusetts has isolated a Listerella from a case of acute cerebrospinal meningitis in a boy. This patient recovered. These seem to comprise all the cases of human infection known to have been caused by Listerella.

Since publishing our preliminary note[1] our organism has been definitely identified as *Listerella monocytogenes,* originally described by Murray, Webb and Swann[8] and isolated by them from a spontaneous disease in rabbits characterized by monocytosis. Similar organisms have also been recovered from a variety of diseases in animals, including a plague-like disease in gerbille in South Africa, meningo-encephalitis in sheep and in cattle, and a disease in chickens associated with massive myocardial necrosis (for a review see Seastone[9] and Jungherr[10]).

The morphology of the organism is described in our preliminary report. Grown on most media it is a short plump (0.5x1-2 μ) gram-positive rod. On certain media it shows marked variation in size and form.[1] We wish to emphasize a morphological feature easily overlooked, namely, the presence of flagella and of motility.

2 Marcellus, M. B., Crouch, E. L., and Terry, M. C., *Northwest. Med.*, 1936, **35**, 50.

3 Burn, C. G., (*a*) PROC. SOC. EXP. BIOL. AND MED., 1934, **31**, 1095; (*b*) *Am. J. Path.*, 1935, **11**, 856.

4 Burn, C. G., *J. Bact.*, 1935, **30**, 573; *Am. J. Path.*, 1936, **12**, 341.

5 Gibson, H. J., *J. Path. and Bact.*, 1935, **41**, 239.

6 Tesdal, M., *Acta Med. Scand.*, 1934, **83**, 351.

7 Carey, B. W., *J. Pediatr.*, 1936, **8**, 626.

8 Murray, E. G. D., Webb, R. A., and Swann, M. B. R., *J. Path. and Bact.*, 1926, **29**, 407.

9 Seastone, C. V., *J. Exp. Med.*, 1935, **62**, 203.

10 Jungherr, E., *J. Am. Vet. Med. Assn.*, 1937, **91**, 73.

We originally classified our strain as a Corynebacterium solely because non-motile, gram-positive, non-acid fast, non-spore bearing, aerobic, rod-like bacteria are usually placed in this genus. Both Gibson[5] and Tesdal[6] classified their strains as Corynebacteria. Burn[3a] reported his strains as "very sluggishly motile"; later,[3b] he stated that he had been unable to demonstrate either motility or flagella and in a final report,[4] that "there was evidence of true motility." The observations of Seastone[8] have been particularly helpful on this point, both with regard to the type motility exhibited by these organisms and the limited cultural conditions under which it is seen. As he has pointed out, it is seen best in 4-hour dextrose broth cultures. He found the type of motility to be rather unusual: "In any one field in a hanging drop, a few individuals will be seen actively moving in a tumbling or spiral manner. These may cease and others commence, often with a preliminary violent spinning." With a modified Leifson flagella strain he demonstrated flagella. We have been able to confirm these observations.

We have compared the cultural and biochemical properties of our strain with 11 other strains of Listerella. These include a strain from Murray, *et al.*, (58.xxiii);[8] the Pirie strain,[11] 4 human strains isolated by Burn[4] and 4 animal strains (Fowl 5407, D-82N. Calf 1864, Cow B-1946) from Seastone[9] and the human strain isolated by Gibson.[5] All have presented essentially the same characters of growth and biochemical properties previously described[1] for our strain. All strains form colonies which are circular, sharply circumscribed, finely granular, domes or cones. At the summits of some there may be a characteristic umbilication or "mortar splash." Viewed by soft indirect light at a magnification of about 30× the colonies are steel gray, silvery, lusterous arcs or cones, which readily reflect the grating of windows or other objects focused on them. On blood agar the colonies are surrounded with a zone of partial (almost complete) hemolysis. On superficial examination the growth on blood agar plates resembles somewhat that of streptococci. All strains ferment xylose, dextrose, levulose, sucrose, maltose, lactose, soluble starch (Pfanstiehl), rhamnose, dextrin and glycerol. Sucrose, lactose and glycerol are fermented late. Galactose is fermented feebly or not at all. A trace of acid was formed by 3 strains, including our strains, the Murray strain and a strain (D-82N) obtained from Seastone; the remainder did not attack this carbohydrate. None attacked arabinose, inulin, raffinose, erythritol, mannitol, dulcitol, adonitol, or inositol. All reduced lit-

[11] Webb, R. A., and Barber, M., *J. Path. and Bact.*, 1937, **45**, 523.

mus, but none reduced nitrates. None digested coagulated blood and none liquefied gelatin. Lead acetate agar was not blackened and no indol was formed.

Antisera prepared against our strain agglutinate the Murray, the Pirie and the Gibson strains in about the same dilutions of serum (1:5120); while the same antisera agglutinate the Burn and the Seastone strains only in low dilutions (1:80 to 1:160). Sera produced against the Burns and Seastone strains agglutinate these strains in high dilutions, but the Murray, Pirie, Schultz and Gibson strains only in low dilutions or not at all. These observations harmonize with previous reports (Seastone,[9] Webb and Barber[11]) and confirm the fact that the New England strains, while morphologically, culturally and biochemically similar to our strain and to the British strains, differ serologically.

No Listerella infections in animals have thus far been reported on the Pacific Coast, and the source of the infection in our case has remained a mystery.

While this report was waiting to be written up, an account of a comparative study of some of these Listerella strains by Webb and Barber[11] appeared This note confirms and supplements their observations.

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Suppression of *Pars Intermedia* of Pituitary Body in *Hyla regilla* by Operations Upon the Gastrula.

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The dual character of the pituitary body and the constant association of its neural and epithelial components throughout the vertebrate sub-phylum, have raised the question of whether or not association of the components is necessary for the development of the gland. Blount (1930), Etkin (1935) and Atwell (1935, 1936) have contributed toward the solution of the problem by means of grafting experiments, performed upon tail-bud stages of early larvae of various amphibian species. This paper is a preliminary account of results obtained by means of a different attack upon the problem.

Smith (1916), Allen (1916) and Atwell (1919) have shown