reported a case of diabetes insipidus arising in a girl aged 11 after a severe head injury. Polyuria remained continuous until the patient's death at the age of 60, during which time she had seven pregnancies. At necropsy the pituitary gland was found embedded in scar tissue and there was no sign of a stalk. Microscopically there was scarring involving the posterior lobe and the tuber cinereum, and extending around the supraoptic nuclei, in which the number of cells was reduced. There was also some reduction in the cells of the paraventricular nuclei. The anterior lobe appeared normal.

Beck and Daniel (1959) reported nine cases that had undergone hypophysectomy or pituitary stalk section for the relief of cancer, in all of which a barrier had been placed between the hypothalamus and the pituitary fossa. In those cases surviving only a few weeks a venous infarct was found in the proximal stump of the stalk at necropsy. Cases examined 2 to 26 months after operation were found to have regenerated nerve fibres in the stump, and some of these contained neurosecretory substance. Although signs of the old infarct, such as haemosiderin-containing macrophages, were present, the impression was of a regenerating posterior lobe in the proximal stump.

Hypothalamus and Anterior Pituitary

There is much experimental evidence that the hypothalamus controls the activity of the anterior lobe of the pituitary, and thereby the gonads, thyroid, and adrenal cortex, through the hypophysial portal vessels of the pituitary stalk (Harris, 1955a). It is probable that the nerve fibres from the hypothalamus liberate a humoral substance which is carried by the portal vessels to the anterior lobe. Thus trauma to the pituitary stalk interferes with anterior-lobe function by damaging the portal vessels. Daniel *et al.* (1959) have shown that such damage can result in infarction of the anterior lobe. This might possibly be followed by regeneration (Daniel and Prichard, 1958).

The results of electrical stimulation of different areas of the hypothalamus suggest localization of control of secretion of the different pituitary hormones (Harris, 1955b). Damage to these areas may result in a selective disorder of function in the anterior lobe. Thus inflammatory and neoplastic lesions of the posterior part of the hypothalamus are known to produce effects such as sexual precocity and hypogonadism (in Fröhlich's syndrome), which must be mediated through the anterior pituitary, although the gland itself is not involved by the lesion and appears histologically normal.

Conclusion

The findings in the present case are not easily interpreted in the light of previous observations. The initial head injury was not severe, but its time relation to the onset of the disease suggests that it was the cause. No alternative aetiological factor was discovered. It is likely that traumatic interruption of the supraoptico-hypophysial tracts produced diabetes insipidus soon after the injury and that retrograde degeneration resulted in the disappearance of nerve cells in the supraoptic and paraventricular nuclei. Anterior pituitary function remained apparently normal after the accident and throughout the subsequent pregnancy and lactation. This makes it unlikely that the anterior lobe could have been damaged at the same time as the neurohypophysis. Hypothalamic control of the anterior lobe must also

have been normal at this time. The presence of haemosiderin throughout the hypothalamic lesion, as well as in the posterior lobe, suggests the occurrence of either haemorrhage or infarction after the injury, but the subsequent evolution of the lesion is difficult to determine. Fibrosis in the central nervous system is unusual, and it may be that with the gradual spread of scarring in the hypothalamus control of anterior pituitary activity progressively weakened until, despite the presence of an apparently normal gland with an intact blood supply, hormone secretion diminished and the clinical picture of anterior pituitary failure resulted.

Summary

An account is given of the case of a girl of 15 in whom diabetes insipidus occurred after a head injury. She later developed anterior pituitary failure and died six years after the accident in pituitary coma. Post-mortem examination revealed widespread sclerosis throughout the neurohypophysis and the hypothalamus, but the anterior lobe of the pituitary appeared normal. Traumatic pituitary failure is discussed and an attempt is made to interpret the features of this case.

We thank Dr. C. A. Young for permission to publish this case, and Professor P. M. Daniel, Mrs. E. Beck, and Dr. R. R. Wilson for their help and encouragement. The illustrations were prepared by Mrs. E. Beck.

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SEPTICAEMIA CAUSED BY AN ORGANISM RESEMBLING PASTEURELLA SEPTICA AFTER A DOG-BITE

BY

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Pasteurella septica is a Gram-negative coccobacillus commonly found in the throats of animals. Schipper (1947) isolated the organism from 14 of 102 trapped wild Norway rats; Smith (1955) found that 61 of 111 healthy dogs were carriers; and the pig, the cat, and the ox are also known to harbour the organism. Apart from its commensal habits, it is also an important pathogen of animals and birds, the cause of haemorrhagic septicaemia, which is highly contagious and usually fatal. Guinea-pigs, rabbits, and other animals inoculated by Schipper succumbed within a day, and he stressed that the possibility of a rat-bite should always be considered when domestic animals die suddenly.

Whereas human infection has curiously never been attributed to rat-bite, there are on record many cases which followed the bites and scratches of other animals,

especially the cat and the dog. Characteristically, the wound fails to heal, signs of lymphangitis and lymphadenitis appear, and abscesses may form repeatedly despite local treatment and the use of antibiotics (Mautner and McIntyre, 1956). Byrne *et al.* (1956) believed that the sharp fangs of a cat were more likely to cause osteomyelitis than the blunt teeth of a dog, though at the time their paper was published only four cases of infection from dog-bite had been recorded (Emsen, 1957).

The organism when isolated from the sputum in bronchiectasis (Needham, 1948; Cawson and Talbot, 1955) is of doubtful pathogenicity, but it may give rise to empyema thoracis (Horne and Berlyne, 1958) and to chronic sinusitis (Bartley and Hunter, 1947). It has even been found in the nose in the absence of symptoms (Wilson and Miles, 1955), purulent meningitis (Regamey, 1938) or brain abscess (Svendsen, 1947) being a potential sequel of operation or injury in such cases.

The accompanying table was prepared at the Epidemiological Research Laboratory of the Public Health Laboratory Service from reports submitted by bacteriologists in public health and hospital laboratories in England and Wales, and it is reproduced by permission of the Director of the Service. It shows that *P. septica* is often isolated from human wounds resulting from cat- and dog-bites, and that of the two animals the dog is now to be incriminated at least as often as the cat. There is little doubt that in these cases the organism is pathogenic, but the pathogenic significance of the isolations from the other sites shown in the table is doubtful.

Isolations of *Pasteurella septica* in 1957, 1958, and 1959*

Source from Which the Organism was Isolated	No. of Cases
Wounds from dog-bites	48
" " cat-bites	33
" " cat-scratches	15
" Wounds " not further described	5
The respiratory tract†	51
Meningitis after a head injury	1
Brain abscess secondary to otitis media	1
Temporo-sphenoidal abscess	1
Ear swabs	3
Antrum washouts	2
Vaginal swab	1
Urine from a case of cystitis	1
Not stated	3
	165

* Unpublished information from reports made by bacteriologists in the public health and hospital laboratories in England and Wales to the Director of the Public Health Laboratory Service.

† So far as the records show, these isolations were from patients with chronic bronchitis or bronchiectasis.

It appears that septicaemia due to *P. septica* has not previously been known to follow a dog-bite.

Case Report

First Hospital Admission

An unmarried comptometer operator aged 30 was admitted to King George Hospital, Ilford, on June 23, 1959. On June 5 she had accidentally trodden on her dog and in return had been bitten on the left foot. Though antiseptic dressings and poultices were applied, the foot became inflamed, and on June 18 she had an attack of shivering, felt unwell, and vomited twice. Two days later she awoke with a tender swelling in the left side of the neck, and on the day of admission, while the pain in her foot had improved, her left thigh was tender and stiff. She also had aches and pains elsewhere, especially in the arms and hands.

There was no previous history of serious illness, but it may be significant that in 1952 she had been treated for allergic rhinitis with a series of desensitizing injections.

On examination she looked ill, was pale and also slightly jaundiced. Her temperature was 103° F. (39.4° C.). She

was drowsy without neck-stiffness, and her respirations were deep and sighing. A swelling in the left side of the neck obliterating the supraclavicular fossa was attributed to enlarged lymph nodes with periadenitis. Two spider naevi on the right hand which had been present since childhood had now enlarged and were pulsatile on light compression. On the inner aspect of the left foot there was an inflamed puncture wound 1 cm. long with a small pustule on its edge. Two smaller superficial abrasions were present on the dorsum of the foot, the whole of which was swollen. Lymphangitis extended from mid-calf to the popliteal fossa, and the posterior aspect of the thigh was tender and indurated. There were a few small non-tender lymph nodes in the left groin. The spleen and liver could not be felt.

Investigations and Progress

Three blood specimens were taken at hourly intervals before starting antibiotic treatment, and in addition a swab from the pustule on the left foot. The first and third blood specimens were sterile on culture, but an organism closely resembling *P. septica* was grown from the second and from the pus swab. A similar organism was also isolated from the dog's mouth (see Appendix). The haemoglobin on admission was 8.2 g./100 ml., white blood count 7,400/c.mm. (polymorphs 70%, lymphocytes 30%), and serum bilirubin 3 mg./100 ml. A chest x-ray film showed patchy areas of consolidation in both lower lung zones. Lumbar puncture the next day showed the cerebrospinal fluid to be normal, and agglutination reactions for *Leptospira icterohaemorrhagiae* and *Leptospira canicola* on June 26 and July 21 were negative.

Intramuscular penicillin, four million units six-hourly, was given from June 23 to July 24, and oral erythromycin, 250 mg., six-hourly from June 29 to August 28. At first the patient's condition worsened. She also developed painful swelling of the wrists and hands and a small pustule appeared on the dorsum of the right great toe. This was aspirated on June 30 but proved sterile. The jaundice deepened; on July 2 swelling of the legs was noted, and on the following day there was extensive oedema of the trunk with signs of ascites. Diarrhoea with incontinence of faeces lasted for five days, and during this time the patient was semicomatose. No pathogens were isolated from the stools.

Biochemical tests confirmed the presence of liver disease. July 3: Serum bilirubin, 6.8 mg./100 ml.; alkaline phosphatase, 10 units; thymol turbidity, 15 units; zinc sulphate turbidity, 25 units. Total plasma proteins, 7.3 g./100 ml. (albumin 2.4 g., globulin 4.9 g.). July 15: Serum bilirubin, 2.3 mg./100 ml.; alkaline phosphatase, 25 units; thymol turbidity, 10 units; zinc sulphate turbidity, 24 units. Total plasma proteins, 6.6 g./100 ml. (albumin 2.3 g., globulin 4.3 g.).

The liver was at no time enlarged or tender, and on July 15 a biopsy, using a Menghini needle, showed only mild focal lymphocytic, sometimes polymorphonuclear, portal infiltration, with no great intralobular Kupffer cell reaction. The lobular pattern was retained and no certain evidence of cirrhosis was found. A portion of the specimen sent for bacteriological examination was sterile.

After two weeks the jaundice and oedema lessened and the naevi on the right hand had reverted to their original size. The joint symptoms improved, the wound on the left foot healed, and the bubo in the neck disappeared. In addition, a further chest x-ray film showed resolution of the opacities in the lungs. Pain in the left leg and low-grade fever continued, however, until July 18, when a large sterile abscess was drained from the posterior aspect of the thigh. Because of a persistent normochromic anaemia (haemoglobin 46%), 1 pint (570 ml.) of blood was transfused on July 26, the patient eventually being discharged home on August 28, 12 weeks after the initial injury.

Second Hospital Admission

On January 7, 1960, the patient was readmitted. Though she had gained weight and had returned to work she had

continued to complain of tiredness with occasional swelling of the legs. Prior to admission a rise in serum antibody titre had been demonstrated (see Appendix). The liver-function tests had also remained abnormal. December 31, 1959: Serum bilirubin, 2.8 mg./100 ml.; alkaline phosphatase, 11.3 units; thymol turbidity, 13.6 units; total plasma proteins, 8.5 g./100 ml. (albumin 3.8 g., globulin 4.7 g.). On the same day the haemoglobin was 12.5 g./100 ml., white blood count 5,000/c.mm., and erythrocyte sedimentation rate 5 mm. in 1 hour (Westergren).

While she was in hospital there were no abnormal findings other than slight jaundice, and she was afebrile throughout her stay. On January 8 liver biopsy was attempted, again with a Menghini needle, but the fragment of liver tissue obtained was too small to base a diagnosis on it.

On January 11 laparotomy was performed, the liver, which was of normal size, showing the coarsely nodular and irregular appearance of post-necrotic cirrhosis. Both lobes were involved and there was no evidence of liver abscess. Microscopical examination of a large nodule taken from the edge of the right lobe showed hyperplastic parenchyma and in parts retained a lobular pattern, with interspersed extensive fibrous tissue heavily infiltrated with inflammatory cells. These appearances suggested post-necrotic cirrhosis.

Post-operatively her progress was uneventful. Three months later her ankles were still inclined to swell in the evenings, but there were no other symptoms.

Comment

Though *P. septica* septicaemia can follow seemingly trivial injuries (Bearn *et al.*, 1955), it is fortunately rare. For despite the organism's *in vitro* sensitivity to many antibiotics (Gorzynski and Neter, 1953), which will protect animals from otherwise lethal invasion (Needham, 1948), bacterial resistance has been shown to develop rapidly in humans (Mautner and McIntyre, 1956), and antibiotics alone may not eradicate the established infection.

In one patient who died within 10 days (Peltier *et al.*, 1938) the source of infection was unknown. Another (Rivoalen, 1936) had been mauled by a panther, but had the good fortune to survive after a prolonged febrile illness; and in yet another (Bearn *et al.*, 1955) septicaemia was attributed to a cat-bite, the infection in this case being effectively cured with penicillin and streptomycin. On two occasions puerperal sepsis may have been responsible. Thus Robinson's (1944) patient developed septicaemia during the eighth month of pregnancy and miscarried within three days, and Pizey's (1953) patient was a 3-weeks-old infant with multiple pyarthroses.

Cirrhosis of the liver would appear to increase the risk of septicaemia during *P. septica* infection. Necropsy on one patient (Peltier *et al.*, 1938) revealed a cirrhotic liver containing at least four abscesses the size of pigeon's eggs; another (Bearn *et al.*, 1955) had previously undergone a portocaval anastomosis for cirrhosis; and in the patient described above the diagnosis of post-necrotic cirrhosis was established at laparotomy. Sherlock (1948) showed that the progression from acute hepatitis to established cirrhosis can occur within 47 days. Yet the absence of cirrhosis in the first biopsy specimen obtained from this patient does not prove that it develops subsequently, for it is in the post-necrotic variety that blind biopsy is most likely to fail (Braunstein, 1956). Furthermore, the changes in serum protein early in her first admission favoured long-standing liver disease, a raised serum globulin being a notable

feature of the post-necrotic cirrhosis of young women (Bearn *et al.*, 1956).

The coexistence of cirrhosis with infection suggests the gut as an alternative portal of entry (Whipple and Harris, 1950), and that pasteurellosis can be enteric was shown by Ludlam (1944), who isolated the organism from an appendicular abscess. Schlecht (1931) also grew *Pasteurella* from the duodenal contents of a patient with severe hepatitis who, because he had eaten chicken—recalling in retrospect its unpleasant taste—was presumed to have been infected with *P. aviseptica*. No other instances of primary hepatitis due to the organism seem to have been recorded, however, and the possibility of pre-existing cirrhosis in Schlecht's patient cannot be ruled out.

Circulating antibodies are not usually found during local infection with *P. septica* (Bartley and Hunter, 1947; Brunsdon and Mallett, 1953), although Allott *et al.* (1944) demonstrated agglutinins in the serum of a patient with an infected dog-bite to a titre of 1 in 80, and in Ludlam's (1944) patient with an appendicular abscess the titre was 1 in 240. In systemic infections, on the other hand, a vigorous antibody response might be expected, as in Robinson's (1944) patient, in whom the titre was 1 in 640. In the present case the surprisingly low titre of 1 in 160 was at first obtained. This was probably not entirely due to the delay in performing the investigation, for Ludlam's (1944) results were noted two months after apparent recovery. In the early stage an excess of circulating antigen may have neutralized all available antibody, or, alternatively, severe liver disease may have impaired antibody production. Yet even more unaccountable was the later rise in titre, and while a persistence or recrudescence of infection would provide an explanation for this, there was no evidence clinically to support it.

The most recent account of wound infection with *P. septica* due to dog-bites is given by Lee and Buhr (1960). They suggest that penicillin should be prescribed prophylactically to all patients with serious dog-bites, and particularly to those whose bites have been sutured. This precaution would appear to be well justified, especially in patients who also happen to have liver disease.

Summary

A patient suffering from post-necrotic cirrhosis of the liver developed septicaemia caused by a *Pasteurella*-like organism following a dog-bite. The infection responded to penicillin and erythromycin after a large abscess had been drained from the left thigh. Though septicaemia due to *Pasteurella septica* is rare in man, it has been associated with cirrhosis of the liver on at least two previous occasions.

The organism isolated resembled closely *P. septica* but differed from the accepted description of that organism in that it fermented lactose and agglutinated to only low titre with a specific *Pasteurella* antiserum. Neither of these unusual features, however, excludes it from the *Pasteurella* group.

I am grateful to Dr. T. F. Elias Jones and Dr. R. J. Henderson, Director of the Public Health Laboratory, Worcester, for their help in investigating the organisms isolated; to Dr. H. K. Weinbren for his reports on the liver biopsies; and to Dr. W. Charles Cockburn, of the Epidemiological Research Laboratory, Colindale, for the preparation of the Table.

APPENDIX

Morphological and Other Characteristics of the Three Strains of Organism Isolated.—PS: From pustule at site of injury on June 23. BC: From blood culture on June 23. D: From dog's mouth, July 1.

Morphology.—A short, oval coccobacillus with rounded ends, about 1.5 by 0.5–0.8 μ , occurring singly, in pairs, and in short chains. Pleomorphism noted in subculture and increased with repeated subculture. It stained Gram-negative; bipolar staining was not a feature and no capsule was seen. (The organism was not observed in tissue-smears.)

Cultural Characters.—Aerobic and anaerobic at room temperature and at 37° C. on ordinary media but not on media containing bile salts. Colonies on agar and blood-agar after 24 hours were small (1–2 mm. diameter) translucent greyish-white disks. No haemolysis seen. No motility in liquid media.

Biochemical reactions to the three strains (PS, BC, and D) were: Glucose +, lactose +, dulcitol –, sucrose +, mannitol +, maltose +, indole +, urease –, gelatin liquefaction –.

Sensitivity to Antimicrobial Agents (Disk Diffusion-Method).—

	Concentration per Disk	Zone of Inhibition (Diameter)	
Penicillin ..	2.5 units ..	21 mm.	} Highly sensitive
Erythromycin ..	10 μ g. ..	21 "	
Chloramphenicol ..	40 " ..	23 "	
Tetracycline ..	10 " ..	17 "	
Sulphafurazole ..	1 mg. ..	25 "	
Nitrofurantoin ..	10 " ..	17 "	
Novobiocin ..	10 μ g. ..	13 "	} Moderately sensitive
Streptomycin ..	80 " ..	0 "	
Neomycin ..	100 " ..	0 "	} Resistant
Bactracin ..	5.5 units (100 μ g.) ..	0 "	

Serum Agglutination Reactions.—These were as follows:

	PS	D
Patient's serum July 29 ..	1/160 ..	1/160
" " October 29 ..	1/80 ..	1/40
Control serum ..	1/20 ..	1/20
Patient's serum, December 22 ..	1/1,280 ..	1/20
Control serum ..	1/10 ..	Less than 1/10

Pathogenicity to Laboratory Animals.—PS: Killed a mouse in 24 to 36 hours and caused an abscess at site of inoculation in a guinea-pig in seven days. D: Killed a mouse in seven days. Non-pathogenic to guinea-pigs. BC: Not done.

Reaction with Specific Antisera.—PS and D: No agglutination titre obtained higher than 1:20.

It will be seen that the organism, though closely resembling *P. septica*, differed from it in fermenting lactose and in failing to agglutinate with a specific pasteurilla antiserum except in very low dilution. Neither of these differences can be taken too seriously. In the past, several strains fermenting lactose have been isolated from animals, and more recently a group of lactose-fermenting strains possessing haemolytic activity have been defined. Agglutination reactions with members of the *Pasteurella* group are often very irregular, varying sometimes even from day to day with subcultures of the same organism. The general properties of the strain described here, taken in conjunction with its pathogenicity for mice and guinea-pigs, render it justifiable, in the absence of more detailed investigation, to include it tentatively in the *Pasteurella* group.

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ANABOLIC HORMONES IN
DERMATOMYOSITIS

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Spontaneous remission and relapse are not uncommon in dermatomyositis, making assessment of the results of treatment difficult. It is apparent from the many remedies listed that no single treatment has been successful. Since their introduction the corticosteroids have been most frequently prescribed, but, while some authors have claimed that these have revolutionized treatment in this group of disorders (Walton and Adams, 1958), others have found their effects to be slight or frankly disappointing (Ragan, 1950; Anderson, 1952; Gross, 1952; Kierland *et al.*, 1952; Wedgwood *et al.*, 1953; Wilson, 1954; Smith, 1955).

We report here two cases of dermatomyositis in which remission occurred after the use of anabolic hormones.

Case 1

Mrs. A, a schoolteacher aged 36, was admitted to hospital in May, 1957, with an acute febrile illness associated with nausea, diarrhoea, and myalgia. On examination she was seen to be of average build, with a

FIG. 1.—Case 1. Section showing widespread necrosis of muscle fibres with aggregations of inflammatory cells. ($\times 400$.)