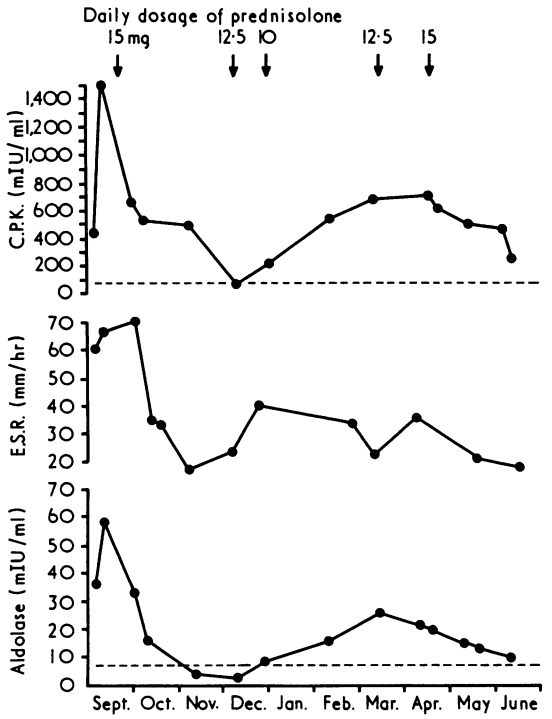

Response to corticosteroid therapy.

involvement occurs rarely in dermatomyositis. The clinical and physiological findings in this case accord with those of the previous 16 cases of dermatomyositis with pulmonary involvement (Dubowitz and Dubowitz, 1964; Garcia and Toledo, 1964; Hyun *et al.*, 1962; Mills and Mathews, 1956; Pace *et al.*, 1963). In nearly all these cases the respiratory symptoms preceded those of the myositis by weeks or months, as occurred in this patient.

In the present case the respiratory symptoms responded well to corticosteroid treatment in moderate doses and the improvement was maintained for nine months, apart from one relapse after reduction in the dosage of prednisolone (see Chart). In the previous 16 patients with dermatomyositis and parenchymal lung involvement a good response to corticosteroids was recorded initially in some patients (Goldfischer and Rubin, 1959; Hepper *et al.*, 1964; Weaver *et al.*, 1968). This was sustained for more than six months in only one patient (Weaver *et al.*, 1968), in whom chest *x*-ray findings were normal after treatment, but lung function studies did not show the improvement recorded in the present case.

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Rhabdomyolysis Caused by Hornet Venom

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Rhabdomyolysis, or acute necrosis of skeletal muscle fibres, is relatively rare. Among the many agents known to cause such necrosis is animal venom but so far this refers only to that of certain species of snakes (Marsden and Reid, 1961; Furtado and Lester, 1968; Rowlands *et al.*, 1969). We report a different type of venom which may produce this lesion. Severe muscle necrosis developed in two patients who sustained multiple stings by insects of the Order Hymenoptera, the hornet *Vespa affinis*.

Case 1

A 37-year-old Tamil man was attacked by a hive of hornets nesting in a tree he was felling. He sustained 250 stings and was admitted directly to hospital in Sandakan, Sabah. Apart from the multiple sting sites and the local swelling they caused there were no immediate effects or allergic manifestations. After 24 hours he complained of generalized aches and pains and had nausea and some vomiting. By the fourth day it became apparent that he was oliguric, having passed only a small amount of dark urine. The blood urea was raised to 139 mg/100 ml, and when this reached 288 mg/100 ml on the fifth day he was transferred by aircraft to the renal unit in Singapore.

He was drowsy, had a tachycardia with extrasystoles, and the E.C.G. showed hyperkalaemic effects; 50 ml of urine obtained by catheterization was dark, acidic, and contained albumin. He was treated by peritoneal dialysis but over the next two days continued to deteriorate with the onset of a severe chest infection. He died nine days after envenomation. Apart from the encrusted sting sites on the skin the main gross finding at necropsy was extensive bilateral bronchopneumonia.

Skeletal muscles were widely sampled for microscopical examination and nearly all showed rhabdomyolysis to a greater or less degree. This varied from almost confluent necrosis in parts of some muscles (Fig. 1) to spotty necrosis of single fibres. A striking feature was the isomorphic proliferation of sarcolemmal nuclei which extended as chains to form myotubes and which were associated with basophilic cytoplasm (Fig. 2). Numbers of mitoses provided further evidence of regeneration. There was a moderate leucocytic and macrophage cellular reaction. Cardiac and smooth muscle remained unaffected. There was renal tubular necrosis with early tubular epithelial regeneration. Widespread focal necrosis had occurred in the liver.

Case 2

A 19-year-old Tamil man was attacked by a hive of insects. He sustained about 180 stings and was admitted to hospital. There were no features of an allergic response. Within 12 hours he had muscle cramps and pains and at 24 hours his urinary output had diminished. The blood urea level was raised to 66 mg/100 ml at 48 hours and he was transferred to the renal unit.

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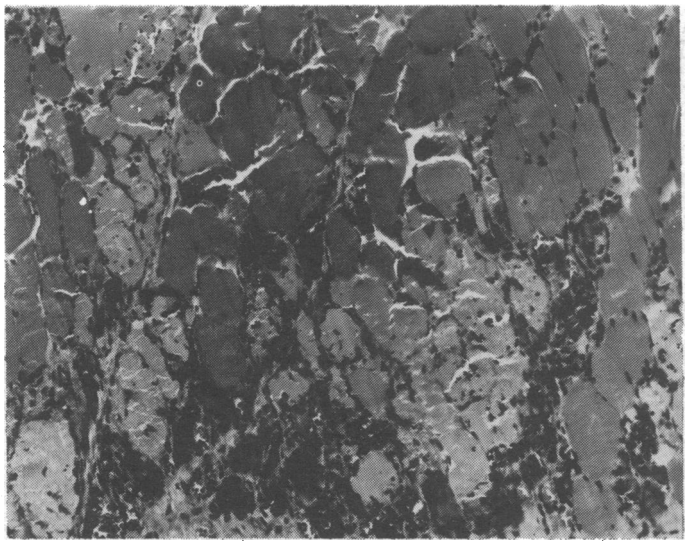

FIG. 1—Case 1. Confluent necrosis in deltoid muscle. (H. and E. × 128.)

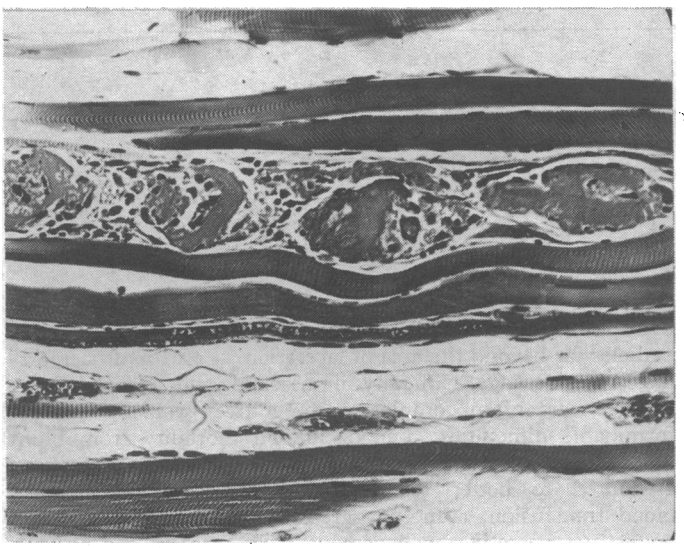

FIG. 2—Case 1. Sarcolemmal nuclear chain near necrotic muscle fibre in psoas major muscle. (H. and E. × 175.)

Results of investigations were: serum potassium 7 mEq/l; blood urea 122 mg/100 ml; E.C.G., hyperkalaemic effects; serum enzymes, gross elevation by factors from 5 to 50 times normal (see Table). Peritoneal dialysis was begun and continued over the next eight days during which he remained oliguric. Haemodialysis was then started and repeated on 10 occasions during the next four weeks until his urinary output was satisfactory.

Serum Enzyme Levels in Case 2 48 Hours after Envenomation—that is, before Dialysis

Enzyme	Serum Level (IU)	Laboratory Normal (IU)
Aspartate aminotransferase	1,260	6-21
Alanine aminotransferase	900	5-18
Creatine phosphokinase	448	5-75
Phosphoglucose isomerase	5,920	18-115
Alpha-hydroxybutyrate dehydrogenase	774	107-286
Lactate dehydrogenase	820	83-234
Peroxidase	49	0-6

On the fourth day after stinging muscle biopsy specimens were taken from the right deltoid and right gastrocnemius. Both showed similar features of severe muscle damage, with loss of striations, swelling of fibres, sarcoplasmic fragmentation, and necrosis. There was a prominent polymorphonuclear leucocytic reaction. One or two sarcolemmal nuclei were in mitosis.

The patient's renal function recovered fairly satisfactorily though at two years he had impaired creatinine clearance and histological evidence of chronic interstitial nephritis.

Identification of Hornets

Specimens of the hornets involved in the two cases were collected and identified. Both were of the species *V. affinis;* that in the first case was further identified as of the subspecies variety rufonigrans (van der Vecht), and that in the second as the variety indosinensis (Perez). The distribution in Asia and South-East Asia and the entomological characteristics of *V. affinis* were described in detail by van der Vecht (1957).

Comment

These two cases show that envenomation by multiple stings of the hornet *V. affinis* may lead to severe rhabdomyolysis with consequent renal failure. Such a sequence has not been noted in previous cases of stinging by hornets or other Hymenoptera. Reports of the effects of Hymenoptera venom, including fatal cases with necropsy study, emphasize the allergic aspects and generally attribute death to anaphylaxis, though occasionally overwhelming toxicity is thought to be responsible (Marshall, 1957). Haemolysis and renal tubular necrosis have been described (Tan *et al.*, 1966).

Though it is possible that the venom may be directly nephrotoxic we believe it more likely that in these cases the muscle necrosis in some way led to the renal lesion. The basis for the rhabdomyolysis is probably due to the presence in the venom of certain toxic substances known to include phospholipases, polypeptides, histamine, serotonin, and acetylcholine (Habermann, 1963). The distribution of the damage, notably the absence of effect on cardiac or smooth muscle, is similar to that resulting from sea-snake poisoning, as described by Marsden and Reid (1961).

We regard the damage as a direct effect of the circulating venom. This is in contrast to certain types of toxic muscle damage such as that associated with malignant hyperpyrexia (Isaacs and Barlow, 1970), where it is believed that only susceptible persons or those having a latent myopathic syndrome develop rhabdomyolysis or myoglobinuria. The subsequent return to normal of the serum creatine phosphokinase level in Case 2 supports this contention.

It is noteworthy that both the muscle and the renal lesions in the situation described are reversible. In future where there is multiple stinging by Hymenoptera it would be advisable for the patient to be hospitalized and assessed for evidence of muscle necrosis. Detection of myoglobinuria (which was not tested at the appropriate time in these patients) would be a valuable guide. In this way early warning of the possibility of renal failure would enable prompt dialysis therapy.

We wish to thank Dr. H. C. Ng, medical officer, Duchess of Kent Hospital, Sandakan, for the clinical notes of Case 1 and for providing a specimen of one of the hornets responsible, and Mr. Eric R. Alfred, curator of zoology, National Museum, Singapore, for providing a specimen of one of the hornets responsible in Case 2 and, together with Dr. D. H. Murphy, lecturer, department of zoology, University of Singapore, identifying the species and variety of both hornets.

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