

It should be possible to use the responses to poly I-poly C—interferon induction, antibody stimulation and induction of specific immune tolerance—in both prophylactic and therapeutic treatment. Poly I-poly C has already been used fairly successfully against experimental virus infection in humans (*Nature*, **225**, 1103; 1970). It is to be hoped that there are no long term toxic effects (so far, humans seem less susceptible than some animals) for it otherwise seems to be a compound with a broad spectrum of activities.

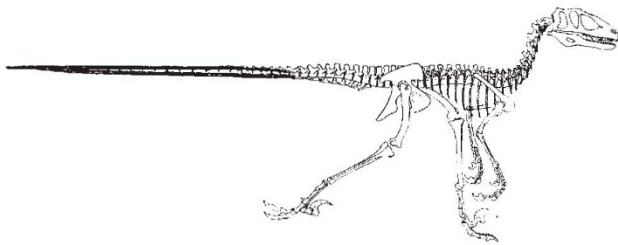
REPTILES

Leaping Dinosaur

from our Vertebrate Palaeontology Correspondent

THE characters defining the groups into which animals are placed by zoological taxonomists often become unsatisfactory as knowledge of the fossil record increases. This is particularly well illustrated by two recent accounts of Mesozoic fossil archosaur reptiles from the United States.

The first account, by John H. Ostrom (*Bull. Peabody Mus.*, No. 30; 1969), is of an extraordinary little dinosaur from the Lower Cretaceous of Montana. *Deinonychus* was about eight feet long in its normal pose, of which more than half was tail. It was carnivorous and is thus classified in the Theropoda within the saurischian dinosaurs. Theropods, all of which were bipedal carnivores, are usually divided into massive carnosaur, culminating in *Tyrannosaurus*, and smaller slenderly built coelurosaurs. *Deinonychus* has some carnosaur characters, such as the anatomy of the skull, some coelurosaur ones such as its proportions and grasping hands, and some unique to itself. Of the latter the most startling are the structure of the hind feet and of the tail.



A reconstruction of the skeleton of *Deinonychus*.

Theropod dinosaurs normally walked on three toes on each hind foot, leaving birdlike tracks. *Deinonychus* walked on two toes, but the outer digit was still present and strongly developed. It bore an enormous blade-like claw and was so jointed that it could be lifted clear of the ground when running, but dropped through nearly 180 degrees to deliver a slashing backward kick. The tail skeleton consisted of elongate vertebrae articulated to move in a vertical plane as a counterbalance in bipedal running, but the vertebrae were surrounded by long ossified tendons apparently capable of locking the tail into a rigid beam by contraction of the anterior tail muscles.

A few ill-known scraps of later American dinosaurs are probably related to *Deinonychus*, but Ostrom suggests that they and it should not be separated as a third group of theropods but rather that the previous division of theropods should be reconsidered.

The second aberrant archosaur, *Hallopus victor* from the Upper Jurassic of Colorado, was described in several papers from 1877 to 1890 by Marsh, but has now been completely redescribed by A. D. Walker (*Phil. Trans. Roy. Soc.*, B, **257**, 323; 1970) after more detailed preparation of the single specimen. The skull is missing and the postcranial skeleton difficult to interpret. Marsh was in doubt as to the taxonomic position of *Hallopus*, but he eventually concluded that it was a very small theropod dinosaur with "a foot especially adapted for leaping".

Walker presents the anatomy of the limbs of *Hallopus* as an extreme modification of the diagnostic pattern of a very different group of archosaur reptiles, the crocodiles. *Hallopus* was quadrupedal with long slender limbs, but the hind legs were considerably longer than the fore legs and both pairs seem to have moved in a fore and aft plane. He suggests that "a hare-like bounding gallop was the most probable type of fast locomotion. . . ."

Hallopus if crocodylian does not correspond to a normal "crocodile concept". It is therefore placed by Walker, together with some less highly modified slender-limbed forms, as a group of paracrocodylians in a larger group also including typical crocodylians. Thus the treatment of *Deinonychus* and *Hallopus* illustrates two ways of dealing with species which do not fit preconceived taxonomic categories.

BACTERIA

Flexible Polymers

from our Microbiology Correspondent

THE way in which cell walls of bacteria retain their shape, chiefly because of the presence of peptidoglycans, has suggested that these structures are rigid. But this notion is no longer acceptable and the work of Marquis (*J. Bact.*, **95**, 775; 1968) and recently of Ou and Marquis (*J. Bact.*, **101**, 92; 1970) has done much to foster the view that bacterial walls are really elastic or flexible.

Marquis has likened peptidoglycans to polyelectrolyte gels in which insolubility is related to the degree of polymerization and the extent of cross-linking between polymer chains. Predictably electrostatic attraction and repulsion can cause cell wall contraction and extension respectively. Ou and Marquis have investigated this prediction using *Staphylococcus aureus*, which has a highly cross-linked (about 100 per cent) peptidoglycan and net positive wall charge (+0.27 mequiv. g⁻¹) and *Micrococcus lysodeikticus* which has less cross-linking (about 40 per cent) in its peptidoglycan and a wall which is negatively charged (-0.64 mequiv. g⁻¹). Furthermore, the wall of *M. lysodeikticus* has a much looser structure than that of *S. aureus*, respective volumes per unit dry weight being 10.9 and 5.1.

At a low ionic strength and a pH of 11-12, isolated cell walls can be considered polyanions. As the pH is lowered the amino groups of the peptidoglycan become protonated and wall contraction results from their electrostatic interaction with the anionic carboxyl groups. In increasingly acid conditions the carboxyl groups themselves are protonated, making the walls polycationic and causing them to expand. Such changes in electrostatic interaction have less effect on the wall