the polymer in order to link ends. This phenomenon of "creep" is familiar in the slow completion of the poly A–poly U reaction. That this is the mechanism, rather than an exchange of oligomers between different polymer chains, is shown by the failure of polyribo-A to affect the rate of the reaction: because the latter will not replace the deoxy-polymer as a vehicle for the linking of oligo dTs, redistribution of the latter between it and the poly dA would be expected to reduce the rate. A linear migration mechanism is also supported by the capacity of oligomers with unreactive ends (3′-phosphoryl and 5′-hydroxyl) to interfere with the reaction of polymers with reactive ends.

In a second paper, Olivera *et al.* (*ibid.*, 275) have observed the formation of circular molecules from oligomers of alternating dAT. This reaction is again surmised to proceed through a "creep" mechanism. An equilibrium is envisaged, in which one of the permitted conformations has, as it were, its ends in the middle of the duplex (and thus two loops, where the chain turns on itself); the ends are thus juxtaposed for linkage. The minimum chain length for appreciable cyclization is seventeen base pairs—below which presumably a two-loop structure becomes too unfavourable to have a significant statistical weight. The optimal rate occurs at a chain length around 25. The reaction is also favoured by increased temperature, presumably because looped structures are more apt to form. Evidence has long been available that such intermediates accompany the initial stages of the thermal melting process in poly dAT. This work represents another original use for the ligase—the exploration of conformations and their stability.

VERTEBRATE PALAEONTOLOGY

Raking Up the Dead

from a Correspondent

At the sixteenth Symposium of Vertebrate Palaeontology and Comparative Anatomy at the University of Reading on September 25–26, the formal presentation of the twenty-seven papers read was brutally curtailed to allow ample time for lively and frequently entertaining discussions.

Dr L. B. Halstead outlined the evolution of his views on the subject of cartilage *versus* bone, from a position denying any relationship, through dreams of collagen and along the false trail of "spherulitic aspidin", to the presence of calcified cartilage in the dermal armour of the earliest vertebrates and the conclusion that cartilage, not bone, was the most primitive of skeletal tissues.

Dr Karen Hiiemäe presented, as a continuation of her previous work on the rat, an elegant slow motion X-ray cine study of mastication in the American opossum, showing for the first time how the primitive tribosphenic molar actually functions. Previous studies, outlined by Dr A. W. Crompton, had wrongly assumed that the mandibular symphysis was rigid, whereas Dr Hiiemäe's film revealed it as a very loose joint.

A disputation on vertebral evolution in early tetrapods was introduced and chaired by Professor A. S. Romer. The rhachitomous type of vertebral column was interpreted by Dr F. R. Parrington as a Wellington bomber with the strengthening struts of the fuselage made into cartilage to allow the large headed labyrinthodonts to "twist". Dr A. L. Panchen, on the other hand, contended that the key to vertebral evolution was, in any case, in the ribs.

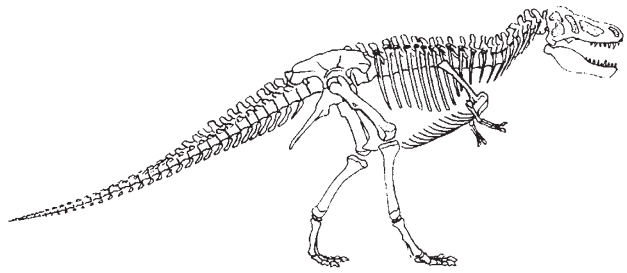

Fig. 1.

Dr C. B. Cox gave an account of the strange reptile *Eunotosaurus*, which figures in many books as the ancestor of the Chelonia. He showed convincingly that it was a cotylosaur, probably a captothinomorph, and moreover that there were no detailed similarities with the Chelonia as had previously been claimed.

The popular carnivorous dinosaur *Tyrannosaurus* had its majestic stance and gait discredited by Mr B. H. Newman. From his study of the skeleton, the only detailed analysis since the beginning of the century, Mr Newman showed that most of the rigid vertebral column was orientated horizontally, the stiff tail comparatively short and habitually held free of the ground and the head supported on a flexible neck. He also suggested that the function of the supposedly vestigial forelimbs was to assist the animal in raising its bulk from the ground. From the further evidence of footprints, he demonstrated that the stride was short and the sinuous gait essentially avian, concluding that *Tyrannosaurus* was probably a "waddling scavenger" (Fig. 1).

The discovery earlier this year by Mr G. R. Chapman of the first Pliocene mammalian fauna (containing rhinoceroses, dinothere, mastodont, hippopotamus, horned bovids, giraffoids, hyracoids, a monkey and a hominoid) from south of the Sahara was reported by Dr W. W. Bishop. The Pliocene was a critical period in hominid evolution as it spans the gap between the Miocene *Ramapithecus* (=*Kenyapithecus*) and the Pleistocene australopithecines (including the so-called "*Homo habilis*").

The final session of the symposium was devoted to viewing a large display of exhibits ranging from thelodont ostracoderms and skin diseases to fossil reptiles and Prehistoric art. The highlights of the exhibits were a number of ichthyosaur skulls developed by acetic acid and displayed by Mrs Jeanne Evans, which revealed details of cranial anatomy never previously observed; and examples of the human form as portrayed in Palaeolithic art, illustrating the salient points of Miss Rosemary Powers's as yet unpublished comprehensive monograph on the subject.

ARCHAEOLOGY

Swanscombe Re-excavated

from our Archaeology Correspondent

A preliminary excavation of the Clactonian flake industries in the lower gravel and overlying lower loam levels of the Palaeolithic site at Swanscombe, financed by the British Museum, the British Museum (Natural