migrant, Eurasian elements. The geographical origins of the Hominidae should be a fascinating area of research in the coming years.

The environment in which the early hominids lived is also an intriguing area of study. Many theoretical discussions of hominid origins have been based on the development of an adaptive complex which emerged in response to pressures from savannah or grassland environments. However, as considerable recent research has indicated, grassland environments were not occupied by the earliest hominids and were, in fact, only entered by this group relatively recently. Therefore, occupation of the savannahs cannot have been the 'initial kick' which led to the emergence of the family Hominidae. Savannah adaptations may well have been important in the course of later hominid evolution, particularly in the Plio-Pleistocene radiation, but they cannot have been an initiating factor. Moreover, it is of interest and of uncertain significance that not all ramapithecines have been found in woodland deposits. In two areas, at Rudabanya, Hungary (Kretzoi *Nature op. cit.*), and, at Keiyuan, south China (Chow *J. paleont. Soc. Ind.* **3**, 123; 1958) this form has been found in lignite deposits indicative of very moist, heavily vegetated conditions.

Clearly, the adaptive radiation of the middle Miocene hominoids was very complex. The human ancestors, rather than showing a unique and singular pattern of evolution were, in fact, part of a much broader process.

'Cardiac' RNA

from Jonathan Slack

It has long been realised by developmental biologists that the formation of ordered patterns of cell types during embryonic development requires the existence of interactions between different parts of the early embryo. The chemical nature of the putative signals has been a tantalising mystery ever since the abortive 'gold rush' to isolate Spemann's organiser during the 1930s. To the biochemically minded, informational macromolecules such as RNA present themselves as obvious candidates, while to the adherents of 'gradient' models they seem to be a red herring, and the signals are generally thought to be small molecules or ions which unleash complex responses from the target cells.

Two recent papers from A. K. Deshpande and M. A. Q. Siddiqui (*Devl Biol.* **58**, 230; 1977; *J. biol Chem.* **252**, 6521; 1977) make up an interesting contribution to this debate. They have isolated a specific fraction of RNA which causes a specific type of cell differentiation in explants from early chick embryos. At the stage concerned (Hamburger and Hamilton's stage 4), a chick embryo consists of two layers of cells: the epiblast above and the hypoblast below. Joining these layers down the centre is a mass of cells called the primitive streak through which cells are migrating to form a mesodermal layer in between the other two. At the front end of the primitive streak is a condensation of cells called Hensen's node, which is supposed to be the 'organising centre' for the formation of the general body plan.

Deshpande and Siddiqui have isolated their RNA species from the hearts of quite advanced (16 day) embryos. It is about 7S (200 nucleotides) in size and contains a sequence of poly(A). When the 'post nodal piece', roughly the posterior third of the early embryo, is treated with this RNA *in vitro*, it differentiates into cardiac muscle tissue.

What distinguishes this result from claims of this type in the past is the careful characterisation of the response and the large number of controls. The positive cases show beating movements and contain myofibrils (electron microscopy), actin and myosin (gels), glycogen granules (histochemistry) and acetylcholinesterase (assay) in quantities appropriate to cardiac muscle cells. The posterior explants do not form cardiac tissue or anything much else when cultivated on their own, nor when treated with RNA from a variety of other sources, or with synthetic polynucleotides. However, it is not yet proved that the 7S RNA enters the cells in an intact form.

The intriguing thing about this result is that it makes little sense in terms of early development. The fate of the post nodal piece in normal development is to form the posterior axial structures—notochord and somites. When cultured on its own *in vitro* it does not differentiate at all, and when cultured in the presence of Hensen's node it will differentiate into axial structures (Butros *J. exp. Zool.* **149**, 1; 1962). It seems probable that this region is competent to form heart since the determination of the overall body plan is still going on at this early stage and classical work showed that quite an extensive lateral area would differentiate into heart when cultured *in ovo* on the chorioallantoic membrane (Rawles *J. exp. Zool.* **72**, 271; 1936). But according to our present ideas about pattern formation the position of the heart rudiment should be specified by two distinct signals. This is because the paired rudiments are situated in a two-dimensional sheet of cells and located symmetrically on either side of the axis. There is no particular reason why any factor involved in these early signals should be present in 16-d heart at all. Significantly enough, the authors show that brain, liver and kidney RNA are all inactive, both in stimulating heart differentiation and in stimulating differentiation of their own cell types.

The 7S RNA itself does not seem to be a mRNA even though it contains a poly(A) sequence, since it cannot be translated *in vitro* and actually inhibits the translation of purified messengers in cell free systems. It will be most interesting to see whether this species exists in the early as well as the late embryo, for if it has a role in normal development it should be possible to find it there. □

Jonathan Slack is a developmental biologist working at the ICRF Laboratories, Mill Hill, London.

First interstellar NO bond

from Graham Richards

The list of interstellar molecules grows longer and longer and many large polyatomic systems have been positively identified with still more postulated. Despite this, NO bonds have been conspicuously absent from the lists and NO itself has been the subject of many unsuccessful searches. Now with the detection of HNO by Ulrich, Hollis and Snyder (*Astrophys. J.* **217**, L105; 1977) this anomaly in the chemistry of interstellar molecules may be removed.

The observations were made in March, 1977 with the 36-foot radiotelescope of the National Radio Astronomy Observatory. The single line ascribed to HNO was detected in emission from the sources known to astronomers as SgrB2 and NGC2024. In general it is difficult to identify a new molecular species positively on the basis of a single spectral line but in this case very accurate laboratory frequencies are available (Saito & Takagi *J. molec. Spectrosc.* **47**, 99; 1973). Further transitions of HNO may require observations at millimetre wavelengths.

Comparison with the very similar molecule HCO suggests an abundance ratio of carbon to nitrogen of about 1.4 in the same interstellar clouds, which conforms with cosmic abundance estimates. The chemical simi-

Graham Richards is a lecturer in the Physical Chemistry Laboratory of Oxford University.