yana points out, these samples may have an important bearing on understanding the geochronology of India, and the uncertainty in isotopic composition suggested by the present comparison is equivalent to a factor of two difference in age of the two samples as calculated in the paper cited. (We also contend that the calculation of the age of galenas by any technique requires some *a priori* evidence that the sample dated can be expected to satisfy the model used, but this is another matter.) Moreover, the analyses originally quoted suggest the primary development of lead isotopes in terrestrial systems having a uranium/lead ratio which we feel to be improbably low. We are also anxious to direct attention to the importance of pressure scattering as a source of uncertainty in lead isotope analyses since it does not seem to have been given sufficient attention by the laboratories carrying out such measurements.

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[1] *Nature*, **193**, 470 (1962).

Russell and Slawson have clearly brought out, presumably for the first time, the significance of the pressure-scattering correction which may change the lead-207/lead-204 ratio by about 3 per cent when low resolution mass-spectrometers are used for the isotopic analysis of lead. This correction, coupled with differences in the mode of measurement of peak heights, is responsible for the discrepancies in lead isotope ratios given by Russell and Slawson and those given by me[1]. It is possible that the correction may improve the accuracy of the lead isotope ratios, but this requires to be corroborated. The objective of this communication is to discuss the conclusions that flow from the revised model age of the Zangamrajupalle galena.

The corrected isotopic constitution of the lead of Zangamrajupalle (see preceding communication) (lat. 14° 45′ 22″ N.; long. 78° 51′ 33″ E.) galena, which occurs as veins in the Cumbum shales of the Upper Cuddapahs, and its model ages are given below in Table 1.

Table 1

$^{206}Pb/^{204}Pb$	$^{207}Pb/^{204}Pb$	$^{208}Pb/^{204}Pb$	Model ages (m.y.)		
16·0	15·1	34·8	1,400*	1,460†	1,470‡

* $^{206}Pb/^{204}Pb$ and $^{207}Pb/^{204}Pb$ age—Houtermann's formula, constants of Russell and Farquhar (ref. 2).

† $^{206}Pb/^{204}Pb$ and $^{207}Pb/^{204}Pb$ age—Houtermann's formula, constants of Moorbath (ref. 3) (read from the unpublished tables (No. 5) of R. P. C. Pockley).

‡ $^{206}Pb/^{204}Pb$ age—formula of Russell, Farquhar and Cumming (ref. 4).

The revised model age (1,400–1,470 m.y.) of the Zangamrajupalle galena has far-reaching implications. Thus the Cuddapahs may not be the time-equivalents of the Delhis, since the post-Delhi pegmatites were found to be 735 m.y. old[5]. This view has been advocated by Holmes[5]. The Cuddapahs may belong to the end phase of the Eastern Ghats cycle (1,600 m.y.) and the period immediately following[5,6]. As pointed out by Holmes[5], the two may be related in the same way as the Indo-Gangetic alluvium is related to the Himalayas.

It must be emphasized that the foregoing conclusions are tentative and require to be substantiated by further work, which is in progress.

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Occurrence of Graywacke in the Lower Siwaliks, Simla Hills

Sikka *et al.*[1] have reported the occurrence of graywacke in the Nahan Series (Lower Siwaliks) near Kalka, Simla Hills, Panjab. The rock has been described as "a grey to greenish micaceous 'sandstone' type" in the hand specimen which in thin sections is seen to consist of "angular grains of quartz (approximately 50 per cent) embedded in a matrix composed of fragments of slate, schist, quartzite, chert, felspar, chlorite and authigenic sericite". The authors appear to be of the opinion that the presence of this rock type in the Siwaliks casts doubts on their fresh-water origin since "it is generally accepted that the graywackes are characteristic of the geotectonic belts".

It is well known that the two distinctive features of a graywacke are its texture and composition. The authors made no precise mention of the texture of the rock although, according to Pettijohn[2], "it alone distinguishes graywacke from all other sandstones". The description of the composition of the rock is also confusing since rock fragments and felspar grains have been regarded as the constituents of the matrix. It is clear that rock fragments and felspar grains do not constitute the 'matrix' but form an integral part of the framework of the graywackes. Since the grain/matrix ratio is important in defining these rocks, it is essential that the amount of 'true' matrix is indicated separately. If this distinction is not clearly brought out, the graywacke proper cannot be distinguished from the sub-graywackes which have a different origin and geologic significance. From the description given by Sikka *et al.*[1], it is not at all clear whether the rock is a graywacke or a sub-graywacke.

Krynine[3] had noted the occurrence of graywacke in the Siwaliks of north-western India and considered them non-marine. It is interesting to note, however, that the same author redefined the term in 1945[2] and created two types of graywackes—low-rank and high-rank. The low-rank graywacke of Krynine so far as composition is concerned is equivalent to the sub-graywacke as defined by Dapples *et al.*[4] and Pettijohn[5].

It is more than likely, therefore, that much of the so-called graywacke of the Siwaliks may, in fact, turn out to be sub-graywacke (the low-rank graywacke of Krynine) if a proper petrographic study is