tutes a most significant improvement. The ductility obtained, as measured by the strain to the onset of tertiary creep, was typically within the range 2–6% which is satisfactory for alloys of this strength.

The data presented here are the preliminary results of a programme aimed at assessing the suitability of the alloys for fuel element cladding in nuclear reactors.

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Received November 8, 1971.

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Nature of Quickclays

Smalley[1] recently disagreed with an old paper of mine[2]. This paper was in fact a translation of a still older publication[3] which was written originally in Norwegian. Smalley ignores the rather extensive Scandinavian literature on the problem since that time. A summary of these results can be found in a more recent publication[4] in which the development from the first crude attempts in 1946 to modern colloidal-chemical viewpoints is stressed.

At the end of his contribution Smalley states "In mineralogical terms, however, quickclays are not really clays at all". This statement needs some qualification. The essential point about the quickclays is that they contain non-swelling clay minerals such as illite, chlorite and vermiculite, but not montmorillonite. The fact that many quickclays have rather a high silt content is due to the higher permeability of silt-bearing than non silt-bearing clays, and thus the probability of a change in the chemistry of the water phase is greater in the coarse varieties. There are also, however, quickclays containing more than 80% particles finer than 2 μm, mainly of illitic nature.

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Received August 6, 1971.

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Reply to Rosenqvist

Professor Rosenqvist has, to a certain extent, missed the point of my note[1]. His famous 1953 paper[2] was cited, rather than some of the more recent Norwegian publications, simply because it is a key paper in the development of quickclay investigations. It, rather than any previous or subsequent papers, introduced into the field of geotechnology the idea of ion leaching leading to quickness. I appreciate that much subsequent work has been done but the basic idea is still held to be valid by most workers in the field and shapes much current thinking on quickclays.

The Rosenqvist approach still puts the emphasis on clay minerals and colloid chemical factors as being responsible for the characteristic properties of quickclays. I wished to suggest that possibly this was not the best approach and that it may be the hitherto neglected non-clay mineral fraction which is responsible for quickness. This proposal was stimulated by the results of Pusch and Arnold[3] who found it impossible to leach a clay mineral soil to quickness, suggesting that the clay mineral content of a soil may not be the critical part. It must be realized that in many quickclays the so-called clay fraction (< 2 μm) contains an appreciable proportion of non-clay mineral particles. And, as regards terminology, if the non-clay mineral fraction forms the bulk of a soil material and determines its properties it is perhaps illogical to refer to that material as a clay.

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Received August 23, 1971.

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BIOLOGICAL SCIENCES

Lung Cancer as an Endocrine Disease

Every cigarette smoker does not develop lung cancer and so factors other than smoking must determine whether or not this disease develops. I have been investigating the possibility that hormones are involved in the development of lung cancer, and have measured the content of individual and total 17-oxosteroids and total 17-hydroxycorticosteroids (17-OHcs) in the urine of patients and controls. I found that patients with lung cancer excreted less androsterone (3α-hydroxy-5α-androstan-17-one), compared with its 5β-isomer aetiocholanolone, and more 17-OHcs than normal subjects[1]. Low androsterone excretion in patients with lung cancer had been reported before[2]. The mean ratios of androsterone to aetiocholanolone and of androsterone to 17-OHcs in eighty-four patients were significantly ($P < 0.00001$) lower than those of 100 normal men and of fifty-two control patients with chest diseases other than lung cancer (hospital controls). In fact the ratio of 17-OHcs to androsterone can be used as a diagnostic test for lung cancer with an accuracy of about 90% (Fig. 1). When the differences between cancer patients and controls were combined by linear discriminant analysis[1], more than 90% of patients had negative discriminant scores whereas more than 90% of normal men had positive scores.

Thus the association between steroid abnormalities and lung cancer is sufficiently high to be of diagnostic value. This association merits comparison with the association between cigarette smoking and lung cancer because of the aetiological significance attached to the latter association. Table 1 gives the smoking habits of lung cancer patients and controls as percentages of the total number in each group.

There was a significant difference in the number of non-smokers in the normal control group compared with the lung cancer group (χ^2 test), but no significant difference in the

Table 1 Smoking Habits of Lung Cancer Patients and Controls

	Lung cancer (84)	Hospital controls (88)	Normal men (100)
Non-smokers	0	2.2	18.0
Cigarettes: 1–14/day	32.2	38.4	28.0
,, 15–24/day	43.3	39.3	36.0
,, 25+/day	24.5	22.1	18.0

Figures are expressed as percentages of total numbers in each group. Numbers in parentheses denote the total number of subjects in each group. Pipe smokers are included with cigarette smokers in this table. One gram of pipe tobacco has been considered equivalent to one cigarette.