1. It was difficult to choose test stones with quite equivalent reactivity.

2. A sufficient content of silica-fume in the cement mixture may protect the test stone against the alkalinity of the cement, even if the stone is strongly reactive.

3. The pop-out in the specimen "20-B-3" may have been promoted by the rapidly available silica in the fine aggregate of the mortar. This may increase the quotient silica/alkaline metal oxides in the gel, which makes the gel more viscous at a given water content.

4. In a practical concrete, the combination "20-B-3" seems to be much more probable than "10-B-4", with all reactive silica concentrated in the test stone. This combination probably will promote the formation of a gel with low viscosity, which easily escapes through the pore system of the mortar.

5. The calcium content of the gel is claimed to be important for the capacity of a gel to shape a crack in the surrounding mortar, or concrete, by absorbing water.
This observation seems to be reasonable, but probably there is no direct causal connection. Primarily, a high quotient silica/alkaline metal oxides in the gel will reduce the pH-value of the gel, and this will increase the calcium ion concentration of saturated calcium hydroxide (or cement) solution. This way, the conditions for building calcium ions into the gel have been improved.
A gel with a very high quotient calcium/alkaline metal ions is probably similar to normal hardened cement paste, and does not expand very much.

6. Tests were made with a scanning electron microscope with EDAX to find out whether the gel composition in the two specimens "10-B-4" and 20-B-3" were different. The tests were, however, not successful. The microscope could not analyse the gel substance separated from the non-reactive grains from the attacked test stone or from the surrounding mortar.

7. Ten per cent replacement of cement with silica-fume did not protect the fine reactive grains in the mortar. The most reasonable explanation may be that the small reactive grains from the choosed gravel pit at Hasle-Bösarp, most abundant in the fraction 1.0 - 2.0 mm, have completed their reaction with the alkaline metal hydroxides before the silica-fume has reduced the alkalinity of the mortar water.
On the other hand, most experiance show that the fine reactive grains from this gravel pit are not abundant enough to be able to damage concrete seriously.

CHAIRMAN'S REPORT, Session 3

C.D. Pomeroy

This session clearly demonstrated the need for specialists who could use highly sophisticated equipment in the study of the underlying factors that control the reactions between certain aggregates and alkalis. Progress with such special methods calls for both dedication and enthusiasm from the individual workers and the four speakers showed both attributes.

However it is not easy for specialists to communicate with a general audience and it was suggested that at any future congress on the subject the specialists be provided with an opportunity to meet together, in small groups, and to report only their general conclusions to the main meeting. It was possible that some of the most advanced techniques were understood by only a small proportion of the audience.

Dr Micheline Regourd, however, gave a clear exposition on X-ray diffraction, electron microscopy and microprobe methods, especially for use in the examination of the matrix-aggregate interface and she stressed the relevance of her work to the practising engineer. Such methods are important in the study of the influence of modifications to cement formulation, or of the inclusion of fly ash or slag into the cement upon the hydration mechanism.

The work described by the different speakers showed how difficult it can be to classify an aggregate as reactive or inert, and this was particularly apparent in the work reported by Olaf Peterson who found it difficult to identify pieces of aggregate that would 'pop-out' as a consequence of reaction.

It is important to have experts available who are skilled in modern techniques that can be used to study the complex reactions that take place as cements hydrate and as the cement reaction products react with the aggregates. The role of the petrographer in classifying the aggregates is also extremely important, as Dr Dolar Mantuani so enthusiastically stressed. However these various skills must be directed towards practical solutions to the problems that the concrete structural designer or contractor faces and a dialogue between the research worker and the user needs to be given greater priority by research worker and user alike. Only in this way will real progress be made in ameliorating the problems that have arisen from the use of alkali reactive aggregates.