

(Fig. 3). Analytical electron microscopy results show that the general evolution is from montmorillonite to illite, which implies a chemical modification of all the structural levels (interlayer, tetrahedral and octahedral).

First electrostatic lattice energy calculations have been made with our "overlap method" (Olives, 1986), of more rapid convergence than the classical Ewald's or Bertaut's methods. We obtain the following energies : (i) -80.16 MJ/mole for an illite of composition $K_{0.75}(Si_{3.25}Al_{0.75})Al_2O_{10}(OH)_2$; (ii) - 82.00 MJ/mole for a smectite of composition $(Na, K)_{0.35}Si_4(Al_{1.65}Mg_{0.35}O_{10}(OH)_2$ (dehydrated montmorillonite) ; (iii) -162.14 MJ/mole (corresponding to $O_{20}(OH)_4$) for the ordered interstratified is, with the structure $\dots O_m(TIT)_iO_m(TIT)_s \dots$ (I, T and O are respectively the interlayer, tetrahedral and octahedral levels ; i refers to the above illite composition, s to the smectite one and m denotes the middle composition between i and s), this structure being that which corresponds to the minimum of the energy . Then, the energy of the interstratified mineral is approximately equal to the sum of the energy of pure illite and that of pure smectite. This is in agreement with the observed coexistence of these three phases in our samples.

Amouric, M. & Olives, J. (1991). *Eur. J. Mineral*, 3, 831-835.
Olives, J. (1986). *Acta Cryst. A*, 42, 340-344.

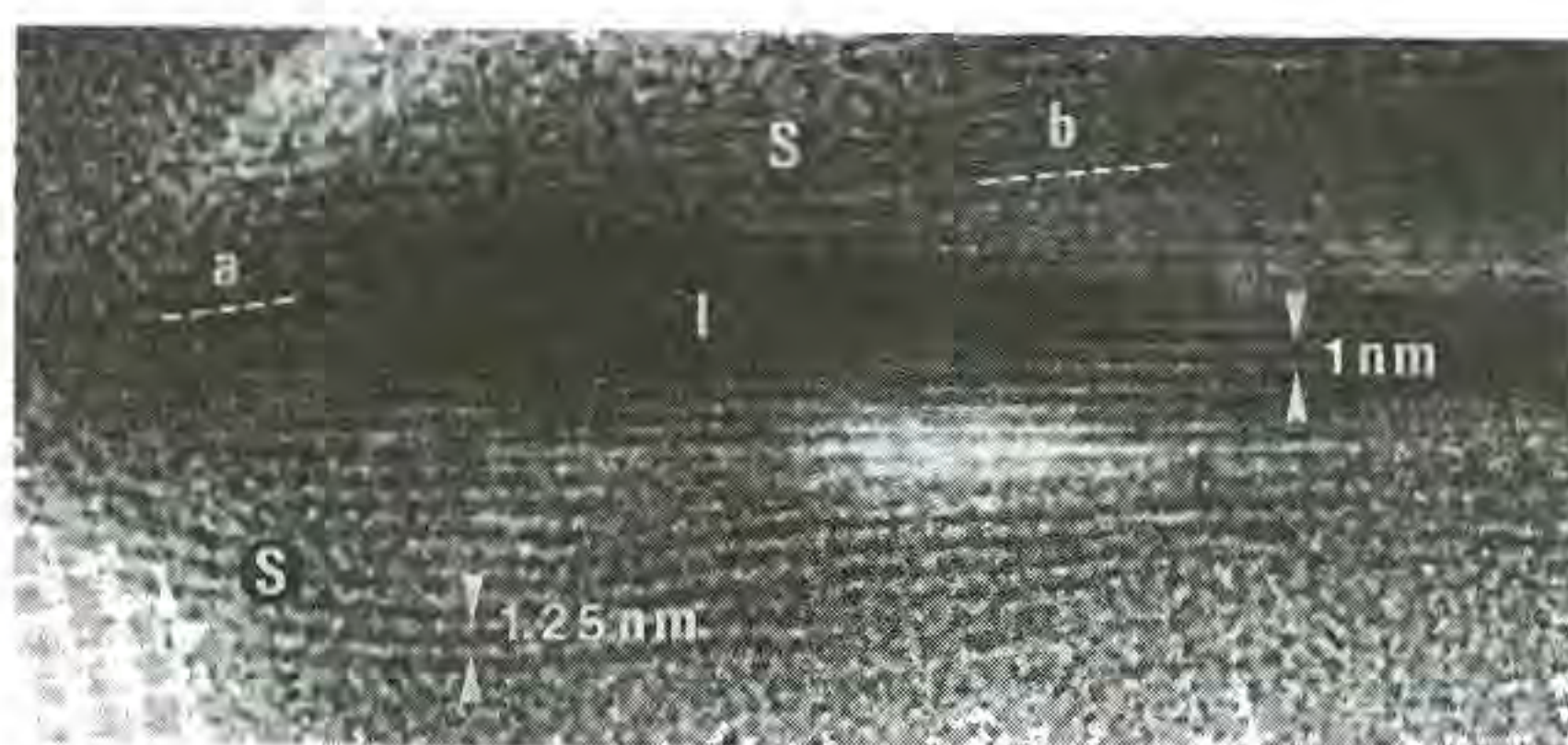


Fig. 1 : The darkly contrasted illite crystal I grows at the expense of surrounding smectite S, cutting the smectite layers (with a small angle) in the upper part of the image (a, b zones).



Fig. 2 : Lateral transition between smectite layers (left part) and illite layers (right part). A continuous lateral transformation : 1 smectite layer → 1 illite layer is observed (indicated by arrows).

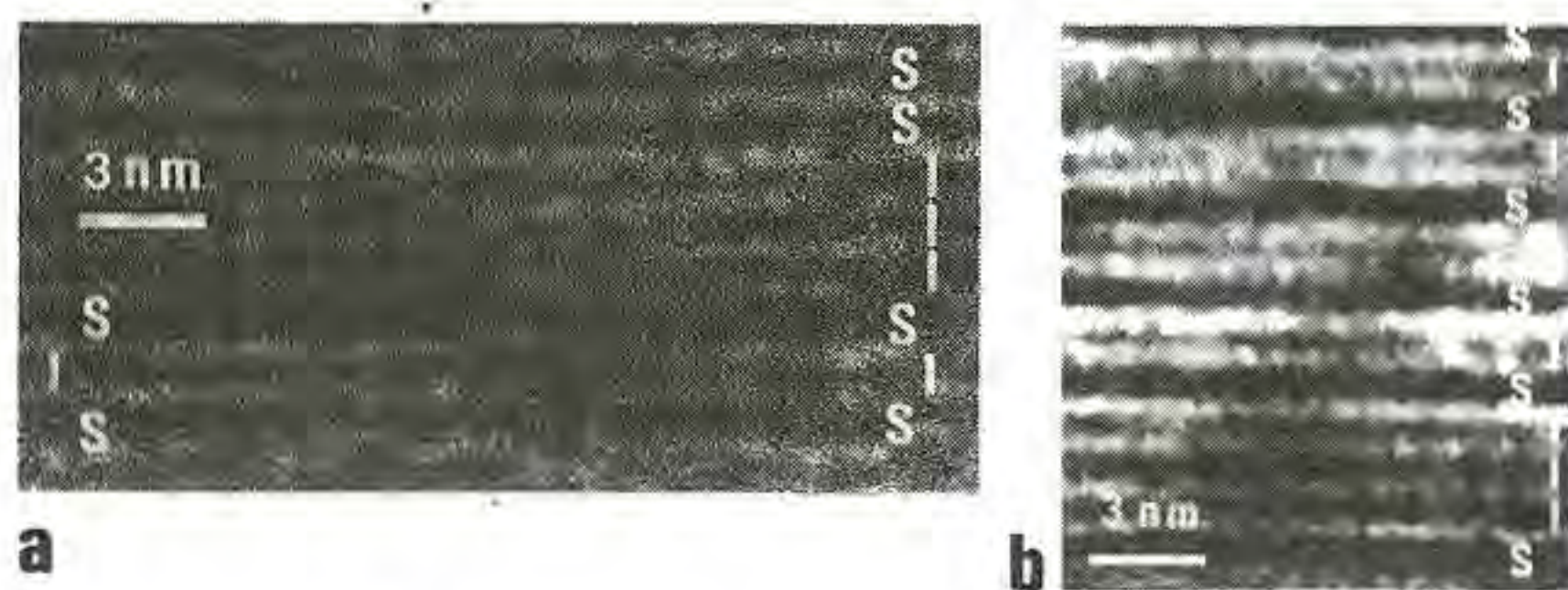


Fig. 3 : Interstratification sequences (I = illite layer, S = smectite layer): (a) disordered type ; (b) IS ordered type

FLUID-INCLUSION DATA OF COLOMBIAN EMERALDS : TOTAL HOMOGENIZATION BY SALT DISSOLUTION.

Ordoñez, F.H.R., Schultz-Güttler, R.A., Svisero, D.
(University of São Paulo, Brasil)

Partial results of an ongoing research on the origin of the Emeralds of Colombia are presented. The deposits are confined along two belts on

the eastern and western flanks of the "Cordillera Oriental" near Bogota, Colombia.

Most studies in the past concentrated on one or the other deposit only. Here, fluid inclusion studies on a total of five deposits (Muzo, Pacho, Yacopi, Coscuez, Chivor) with altogether 450 fluid inclusions (FI) studied complement the existing data.

The most important finding of the microthermometric measurements is that all FI from all deposits showed **PARTIAL homogenization by vapor disappearance before TOTAL homogenization by salt dissolution** (Halite at Muzo, Pacho, Chivor and Coscuez, but Sylvite at Yacopi). The temperatures of partial homogenization are $210 \pm 30^\circ\text{C}$ and those of total homogenization $330 \pm 30^\circ\text{C}$. Emeralds from Chivor showed slightly higher temperatures of $370 \pm 30^\circ\text{C}$. These results reconfirm data given by Ottaway et al., 1986, from Muzo and by Giuliani et al., 1992, from Coscuez, but not those given by Kozłowski et al., 1986, from Somondoco.

As a first approximation of the complex chemistry of these fluids, the data are displayed in the model systems $\text{CaCl}_2\text{-NaCl-H}_2\text{O}$ and $\text{CaCl}_2\text{-KCl-H}_2\text{O}$ respectively. One notes very high salt concentrations of about 40 to 50% by weight for all deposits.

Minimum pressures of sealing of these FI are estimated by the method of Solovava et al., 1992, in the model system $\text{NaCl-H}_2\text{O}$ using the difference of temperature between the vapor disappearance and salt dissolution. Pressures determined this way are independent from any estimated thickness of former overburden based on the geological history. Since the system $\text{NaCl-H}_2\text{O}$ shows a quite high vapor pressure along the Liquid(L)-Solid(S)-Vapor(V) coexistence curve and the slope of the halite dissolution (L+S/L) curves should not be strongly dependent on the presence of other dissolved ions, the pressures so estimated may very well be maximum pressures of closing and formation of those FI. The values found define a mean of about 1400 bars. It is therefore likely that the mean conditions of the formation of the FI's and consequently of the emeralds are about 330 to 370°C and about 1400 bars pressure.

This pressure translates to about 5 km of former overlying rockstrata at the time of formation of these emerald deposits and, if one considers the lithostratigraphy of the "Cordillera Oriental" as shown by Dengo & Covey, 1993, appears reasonable.

Dengo, C.A., Covey, M.C. (1993) *Bull AAPG*, 77, 1315-1337
Giuliani, G., Sheppard, M.F., Cheilletz, A., Rodriguez, C. (1992) *Compte Rend. l'Acad. Sc. (Paris)*, 314, 269-274
Kozłowski, A., Metz, P., Estrada, H.A.J. (1988) *N. Jb. Min. Abh.*, 159, 23-49
Ottaway, T.L., Wicks, F.J., Spooner, E.T.C. (1986) *Fluid Inclusion Research*, 19, 322
Solovava, I., Girnis, A., Gruzskova, A., Naumov, B. (1992) *Geochem. Intern.*, 29, 64-74

• STUDY OF ANORTHOCLASE MICROSTRUCTURE FROM KILIMANJARO

Organova N.I., Marcille I.M., Borutsky B.E. (IGEM RAN), Zacharov N.D. (IKRAN), Salyn' A.L. (GIN RAN, Moscow, Russia)

X-ray (powder diffractometer, Guinier camera, Smith method), chemical (microprobe) and electron microscopy (TEM and HRTEM) study of anorthoclase sample with formula $\text{Or}_{24.2}\text{Ab}_{65.2}\text{An}_{9.5}\text{Cn}_{0.5}\text{SrFsp}_{0.6}$ has been carried out. Unit cell dimensions are: $a = 8.25(2)$, $b = 12.93(4)$, $c = 7.13(2)$ Å, $\alpha =$