oval structures is related to the emplacement of granitic masses. Such morphologies appear to represent the «skin» manifestations of early dynamic granites that outcrop in some zones. These granites, in later reactivation processes, together with others of new generation, can reach the Earth's surface.

The relationship between these oval structures and the dynamic emplacement of granitic masses was mainly deduced through petrological studies on various petrographic facies associated to these structures, such as: brecciated quartz-feldspathic rocks, sedimentary limestones, «kaoliniferous» minerals, etc.

Although the physical stage (melted or solid) of emplacement of these oval granitic masses is not considered here, we relate the origin of these granites with crustal thickening phenomena in such zones. Both, granites and interrelated thickening phenomena, could be related to some mechanism of «sialic-mantle segregation» (not well understood) or transformation of the Upper Mantle in sialic crust (according to a particular expansion theory) with more or less participation of suitable sedimentary materials.

These oval granitic morphologies appear to represent the most suitable structures of the plutons for their mobilization and later emplacement, since they require the minimum of energetic conditions.

The structural-petrological resemblance of these Spanish oval structures with other foreign counterparts could suggest the existence, in many places, of a similar relationship between oval structures and the origin of certain rocks with dynamic emplacement of granitic masses.

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SANCHEZ CELA V.*, ORTIGA M.*, GARCIA R.*, APARICIO A.*, LAPUENTE M.P.* - *Lamprophyric rocks in Central Pyrenees (Panticosa, Spain). Structural and petrological features*

In the Panticosa Massif, associated to Hercynian circumscript granites, there exist abundant dikes of lamprophyric rocks with two structural arrangements. The earliest placed dikes show Northern bearings (N 10-20° E), whereas the most recent, probably of a late Hercynian age, are arranged approximately in an E-W direction (N 90-110° E).

The N-S dikes, not properly defined as lamprophyres, can be included among «protodiabases» and similar rocks. They consist of Na-plagioclase, quartz, chloritic and Fe-Ti mineral, as well as a great deal of carbonatic-argillaceous minerals, which are very interesting from a petrogenetic point of view.

The W-E dikes, of a mainly kersantitic nature, show tipical lamprophyre features. They are composed of plagioclase (andesine types), kaersutite, Ti-augite Fe-Ti oxides, as well as carbonates and other accessory minerals. Their texture varies from a trachytic tipe on the borders, to doleritic in the centre.

The origin of Panticosa lamprophyric rocks is suggested to have a certain connection with their structural emplacement. The N-S dikes, with the fewest igneous features, are found to be associated with Hercynian secondary structural accidents, where uplifting phenomena were not important. On the contrary, the W-E dikes happen to be related to the main Hercynian structures, where important uplifting phenomena and mylonitic-shear-friction processes have taken place. In this way the anatexis induced by mechanic processes together with crustal materials of diverse nature could have a certain importance in the origin of these lamprophyric rocks.

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SANTOS OLIVEIRA J.M.* - *Geochemical features of Hercynian granites of Portugal. Considerations on their metallogenetic importance*

The Hesperic massif, which occupies the western and central part of the Iberian Peninsula, makes up the most continuous fragment of the Hercynian Chain of Europe.

The Hercynian orogenesis was accompanied, in this region, by regional metamorphism and some phenomena of synorogenic magmatism, producing two main types of granitoid rocks:

a) alkaline and peraluminous leucogranites, emplaced during the tectogenesis (probably by humid anatexis of the middle part of the crust) and controlled by regional metamorphism (mesocrustal granites);
b) monzonitic calcalkaline and metaluminous granites, with associated basic rocks, emplaced during and after the tectogenesis from a dry fusion of the lower part of the crust (deep crustal granites).

The geochemical analysis of W, Sn, Li, Rb, Ba, Sr, Nb, Zr, Y and F in some granitoids of the north of Portugal led to the distinction of those groups of rocks.

Fluorine revealed to be important element showing an enrichment in the deep crustal granites (average of 1275 ppm) in comparison with the mesocrustal granites (average of 992 ppm). The trend of variation of this element in a granitic system indicates a progressive enrichment until the calcalkaline granitic series.

The contents of Rb, Li, Ba and Sr and some selected parameters, such as Rb/Sr, K/Rb and Mg/Li, also appeared to be useful to distinguish the two types of granites.

In metallogenetic terms, both granitic series contain specialized rocks, i.e., susceptible to be associated with mineralisation of granitophile elements, although the deep crustal serie has revealed values of higher geochemical and metallogenetic specialization.

Fluorine, together with the alkaline elements Rb and Li, the Rb/Sr, K/Rb and Mg/Li parameters and also Sn and W can be used as litogeochemical guides for mineral prospecting, either at a regional scale of province, or at a local scale of little plutons. The following values

(provisional) are suggested to be taken in account as regional geochemical thresholds for this study area: 1700-2000 ppm of F; 250-270 ppm of Li; 580-750 ppm of Rb; 20 ppm of Sn; 2-4 ppm of W; and values of 15-30, 40-80 and 1-10 for the Rb/Sr, K/Rb ad Mg/Li, respectively.

The application of multivariate mathematical techniques of data treatment (factor analysis) led to the discrimination of two principal factors: one petrogenetic, characterised by the Ba-Sr-Zr-Y association, and the other metallogenetic, defined by the F-Rb-Li-Sn group. It appears from these data that F should be an important element as a carrier for W and Sn.

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SATIR M.* - *Stable isotope investigations of polymetamorphic rocks from the Western Tauern Window (Austria)*

Petrological, geochemical and geochronological studies in the Western Tauern Window have distinguished two mineral parageneses. Hercynian and Alpine. Hercynian metamorphism involved anatexis (280 Ma) and plutonism (250 Ma). The Alpine event (between 40-15 Ma) involved progressive metamorphism with greenschist facies in the north and amphibolite facies in the south.

Oxygen isotope fractionation between minerals of the Hercynian paragenesis gives a maximum temperature of 620°C for the Hercynian metamorphism. Alpine minerals give temperatures increasing from 450°C to 560°C from the northern edge southward into the central Tauern Window.

The Hercynian micas give, with one exception, Alpine Rb/Sr and K/Ar ages, although they preserve high oxygen isotope temperatures consistent with the high-grade Hercynian metamorphism. The Alpine minerals give Alpine Rb/Sr and K/Ar ages and lower oxygen isotope temperatures. These relations indicate mobility of radiogenic Sr and Ar from the interlayer sites of the Hercynian micas during Alpine metamorphism whereas the Si = O and Al = O bonds in the tetrahedral and octahedral layers were not disturbed.

The hydrogen isotope composition of Hercynian (brown) biotite is preserved through Alpine metamorphism in a relatively H_2O-poor closed system. The coexisting Alpine biotite (green) has lighter δD values than the Hercynian biotite. During recrystallisation of brown biotite to form green biotite, the lighter δD isotopes were incorporated in the latter.

The O- and H-isotope compositions of both Hercynian and Alpine parageneses show that the Alpine metamorphism did not introduce significant amounts of fluid. By contrast, the O-, H-, and Sr-isotope data of Hercynian minerals suggest a wide-spread homogenisation caused by open-system behaviour during the Hercynian metamorphism.

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SERRA P.R.* - *The Alforja breccia body (NE Spain) and its origin by explosive phenomena in an epiplutonic magma chamber*

In the Southern Catalonian Coastal Ranges intrusive complex (whose principal characteristics are summarized by SERRA & ENRIQUE in a companion abstract), breccia bodies related to igneous processes and having varied morphologies, structures, degrees of complexity and modes of occurrence, are sparsly distributed. To start with the study of these formations I have chosen the Alforja breccia body because it meets several favourable conditions: a) its exposition is very good in a road cut in which has an observable width of around 100 m; b) the Alforja massif, in which breccia occurs, is at present the best known intrusive unit of the complex, and c) the igneous origin of the breccia is easily demonstrated since pebbles are embedded in an igneous matrix.
The breccia body is located inside a tonalitic unit that is the dominant lithology in the Alforja massif. Structurally this formation is composed of puzzling network of irregularly shaped and connected pebble masses that isolate between them big blocks compositionally identical to the tonalitic host. In the road-cut, the breccia is seen limited at both sides by two dykes, few metres thick, that are in direct contact with the unbrecciated tonalite. Field relationship outside the road-cut indicate that the two dykes are not two, but only an arcuate one that encircles the breccia.

From inside outwards, subtle gradational changes took place that give the breccia a zoned structure. Essentially these changes affect the size, shape and lithology of the clasts, and the morphology of the pebble masses.

Pebble masses are commonly thick throughout the breccia, but in the outer zone there are also more delicate, thin, dyke-like, anastomosed pebble masses.

Clast sizes can vary from millimetric to metric; the commonest ones have dimension between 5 and 15 cm.

Clast shape varies from very angular to well rounded; it depends on lithology and on location inside the breccia body. Roundnees is better developed in the inner zone.

Granulometric classification is in general poor and clasts of all sizes are mixed.

Clasts composing pebble masses can be tonalitic, leucogranitic, porphyritic and sedimentary. These latters are extremely rare. The commonest lithologies are those tonalitic and leucogranitic. The former ones are petrographically identical to the host tonalite. Porphyritic pebbles are markedly concentrated in the interior. Leucogranitic ones are sligthly enriched in the outer zone, while tonalitic clasts follow a reverse trend. In general, the most angular pebbles are leucogranitic and the best rounded ones are porphyritic.

An igneous matrix occupies interstitial spaces between pebbles. It is composed of a fine-grained, phaneritic and equigranular rock of granitic to granodioritic composition. It shows no important signs of deformation except undulating extinction in some quartz grains and an incipient mortar texture in some grain boundaries. Crystal pulled away from clasts are almost securely present in the matrix.

Some inter-pebble spaces are not occupied by igneous