In the ternary systems Ca-Al-Ge and Sr-Al-Ge three germanides with new structure types have been synthesized from stoichiometric ratios of the elements. Their crystal structures were determined using single crystal X-ray data. In the structure of Sr$_3$Al$_2$Ge$_4$ (monoclinic, space group $C2/m$, $a = 1267.6(4)$ pm, $b = 416.2(2)$ pm, $c = 887.4(3)$ pm, $\beta = 110.37(2)^\circ$, $Z = 2$, $R_1 = 0.0354$) Al-Ge sheets with Al in tetrahedral (i.e. Al$^-$) and Ge in threefold $\psi$-tetrahedral (i.e. Ge$^-$) coordination against Ge are present. Thus, the compound can be classified as an electron precise Zintl phase. This finding is verified by the result of a band structure calculation (within the FP-LAPW approach), that shows a distinct minimum of the total density of states at the Fermi level. The structure of Ca$_{10}$Al$_6$Ge$_9$ (trigonal, space group $R\bar{3}m$, $a = 1398.45(14)$ pm, $c = 2107.4(3)$ pm, $Z = 6$, $R_1 = 0.0613$) contains complicated sheets of trigonal planar building units [AlGe$_3$] and [AlGe$_4$] tetrahedra. The compound Ca$_{20}$[Al$_3$Ge$_6$]$_2$[Ge] (hexagonal, space group $P6_3/m$, $a = 1600.9(2)$ pm, $c = 458.48(7)$ pm, $Z = 1$, $R_1 = 0.0282$) shows two planar trimers of [AlGe$_3$] triangles of formula [Al$_3$Ge$_6$] besides isolated Ge atoms (i.e. Ge$^{4-}$). The overall electron count of the latter compounds, that contain trigonal planar coordinated Al atoms and considerable multiple bond character of the Al-Ge bonds, shows a very small deviation from the Zintl concept, comparable to the one observed in other aluminium-germanides like SrAlGe.

**Key words:** Aluminium, Germanium, Zintl Phases