CHAPTER V

DISCUSSIONS

The histograms of frequency distribution of stars as shown in Fig. V and VI, having the peak at 3-prong stars, are similar to the results of Charoen Darmaphajija and Thaworn Snttipongse (22). The histograms of frequency distribution of stars are also similar to the results found by others who exposed plates at higher latitudes and longitudes such as Brown et al. (11), and Page (20).

These results show that the great part of cosmic rays at this level are non-ionizing particles both from the east and from the west, and the particles are at low energies. The total rates of production of stars coming from the east and from the west are very slightly different. From Table I and II the rate of productions of 3-5 prong stars both coming from the east and west are higher than those coming from the north and south, but those of greater than 5 pronge, as shown in Table I and II, are in negative values. These results indicate that the particles properly causing 6, 7, 8 prong stars lose their energy in traversing the lead absorber, causing lower prong stars, another possible cause of lower prong stars may be the formation of gamma rays of high energy which in turn may produce photodisintegration stars. The photodisintegration stars like those reported by Wilkins and Goward (23) were observed in large numbers on both easterly and westerly exposed plates. Telegdi (24) and Wilkins (25) and others studied photodisintegration stars formed in nuclear emulsions by irradiation with synchrotron and bevatron bremsstrahlung and observed three and four prong stars according to the following equation:

$$C^{12} + \gamma \longrightarrow Be^{8} + \alpha \longrightarrow 3\alpha$$

$$O^{16} + \gamma \longrightarrow 4\alpha$$

However, photodisintegration stars caused by the gamma ray components of cosmic rays seem to escape detection, such as in the former works of George and Jason (26) and others, who used thin films of not more than 200 μ thick. Subsequent work in photodisintegration stars emphasized that thick emulsions around 400 μ thick are necessary to bring most charged particle products to rest before they pass into the glass or air.

Other events which we observed in plates under lead both in the east and the west directions are tracks of knock-on charged particles resulting probably from collisions of particles in lead. Sometimes, these tracks terminated in the emulsion resulting in the formation of stars.

The numbers of stars greater than 2-prongs are used to estimate the asymmetry effect in table IV. The numbers of two prong stars are excluded in this estimation because our counting of two-prong stars is liable to be in errors due to 3 factors, i.e. the presence of radioactive stars in the emulsion (thorium impurity), the deviation or scattering of a single track, and the fact that an incompletely decayed event may be easily mistaken as a two prong star. It will be seen from Table IV that the ratio between west and east is 1.10 ± 0.03 which is approximately 10% increase in the easterly over the westerly direction. The preponderance of positive charge particles is attribute to protons. (see Chapter I)

If we assume that neutrons are distributed in all directions to produce neutron stars, we can see clearly this preponderance of positive charged particles, since there is little evidence of negative charged particles which cause nuclear interaction in any great number, at ground level, the particles coming from the east to produce stars will be neutron. The particles coming from the west to produce stars will be neutrons and protons. Thus, there are more protons coming from the west than from the east. If at high energy protons are rarely absorbed, the ratio of the number of protons plus neutrons to the number of neutrons (i.e. the ratio of west to east) should an increase as the number of prongs per star increases. The plot in Fig. M 9 confirms the above assumption.