transform as an L dimensional representation (R) of the gauge group G.

In such a scheme the vector mesons associated with the generators of G are neutral with respect to SU(3)xSU(3). The labels 1,2...L which distinguish the different quark triplets can be thought of as colors, so that the strong interactions are mediated by colored gauge mesons. Colored quarks have been considered before(42) for other reasons, and there is some evidence that three colors would be welcome. We shall therefore consider a model in which the strong gauge group is SU(3) and the fermions are color triplets (L=3) (although as far as asymptotic freedom is concerned any group will do).

In this model Ψ transforms under an infinitesimal gauge transformation according to:

$$\Psi_{(x)} \rightarrow \Psi(x) + i\varepsilon_a(x)\ \lambda^a \Psi(x) \qquad 5.4$$

and under an ordinary SU(3) x SU(3) transformation according to:

$$\Psi(x) \rightarrow \Psi(x) + i\Psi(x)\lambda^a \varepsilon_a \qquad 5.5$$

(the λ^a are the usual SU(3) matrices). Our Lagrangian is:

$$L = L_V + \mathrm{Tr}\{\overline{\psi}(i\not{\partial} - g\not{B}_a\lambda^a)\psi - \overline{\psi}\psi M\} \qquad 5.6$$

where L_V is given by Equation 2.5 and M is the fermion mass matrix. This model is asymptotically free. The numerical value of $\beta(g)$ is:

$$\beta(g) = -\frac{b_o}{2}\ g^3 + \cdots = -\frac{g^3}{2}\ \left(\frac{9}{8\pi^2}\right) + \cdots \qquad 5.7$$

The ordinary SU(3)xSU(3) vector, $V_\mu{}^a$, and axial vector, $A_\mu{}^a$, currents are given by: