Adult *Tabanus fraternus* (Diptera: Tabanidae) (from Chainey, 1993).
4.1 INTRODUCTION

The Diptera are the true flies. The word 'Diptera' is derived from the ancient Greek *dipteran*, meaning two winged. In most of the orders of winged insect, adults have two pairs of wings. However, the Diptera have only one pair, the hind pair of wings having been reduced considerably to become small, club-like organs called *halteres*.

The Diptera is one of the largest orders in the class Insecta, with over 120,000 described species. All these species have a complex life cycle with complete metamorphosis (see section 1.7.2). Hence, the larvae are completely different in structure and behaviour to the adults. As a result, dipterous flies can be ectoparasites as larvae or adults, but they are rarely parasites in both life-cycle stages. This chapter deals with adult dipteran ectoparasites and Chapter 5 with ectoparasitic dipteran larvae.

4.2 MORPHOLOGY

Most of the adult Diptera are relatively small, ranging from about 0.5 mm to 10 mm in length. However, there is considerable morphological diversity within the order.

The body is divided into three tagma, the head, thorax and abdomen. The head is large and highly mobile. It carries two well-developed, large, compound eyes and a single pair of antennae of variable size and structure (Fig. 4.1). In a typical antenna there are three principal components: the *basal segment*, known as the *scape*, which attaches the antenna to the head, the second section known as the *pedicel*, and the third section, the *flagellum*, which is usually long and can be made up of many sub-segments. Although most have this basic design, the antennae can take on a wide variety of forms and are of considerable importance in the identification and taxonomy of Diptera.

In many dipteran species, especially in male flies, the eyes often meet in the front. This is described as the *holoptic* condition. In other flies, particularly females, a strip of the head called the *frons* separates the eyes, producing what is known as the *dichoptic* condition. The top of the head commonly bears three simple eyes, known as *ocelli*, arranged in a triangle, although they are absent in