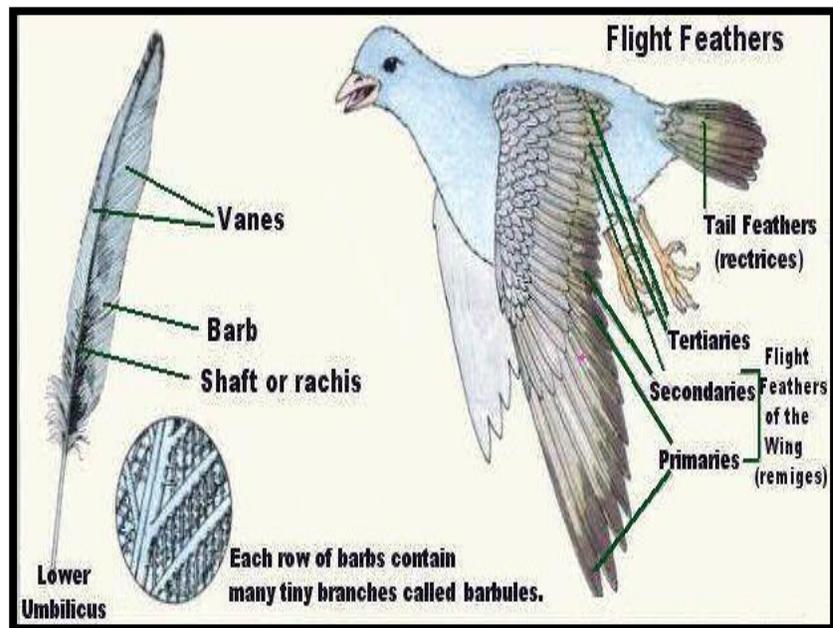


Dr. Minakshi Kumari  
P.G. Dept. Of Zoology.  
Maharaja College, ARA.

B. Sc. PART-II ZOOLOGY (Hons.)  
PAPER – III( A)  
PHY – CHORDATA.

## **FEATHERS OF *COLUMBA LIVIA* (The Rock pigeon)**



### **GENERAL INTRODUCTION :**

- Feathers produced by birds are extraordinarily diverse and complex in nature.
- The diversification of feathers arises to congregate numerous physiological and functional requirements of the bird.

- The various functions include flight, swimming, thermoregulation, physical protection, visual and tactile communication, sound production, foraging and water repellency.
- To execute a specific function, feather structures undergo certain changes in size, shape, colour, and texture
- In an individual bird various layers of feathers are found in different parts of the body and altogether it forms there complete plumage pattern.
- As a consequence plumage pattern offers an ideal topic for understanding the process of evolution among birds.

**SYSTEMATIC POSITION :****Phylum: Chordata****Class: Aves****Order: Columbiformes****Family: Columbidae****Genus: *Columba*****Species: *livia*****TYPE : *Columba livia***

## **Feathers Of *Columba livia* :**

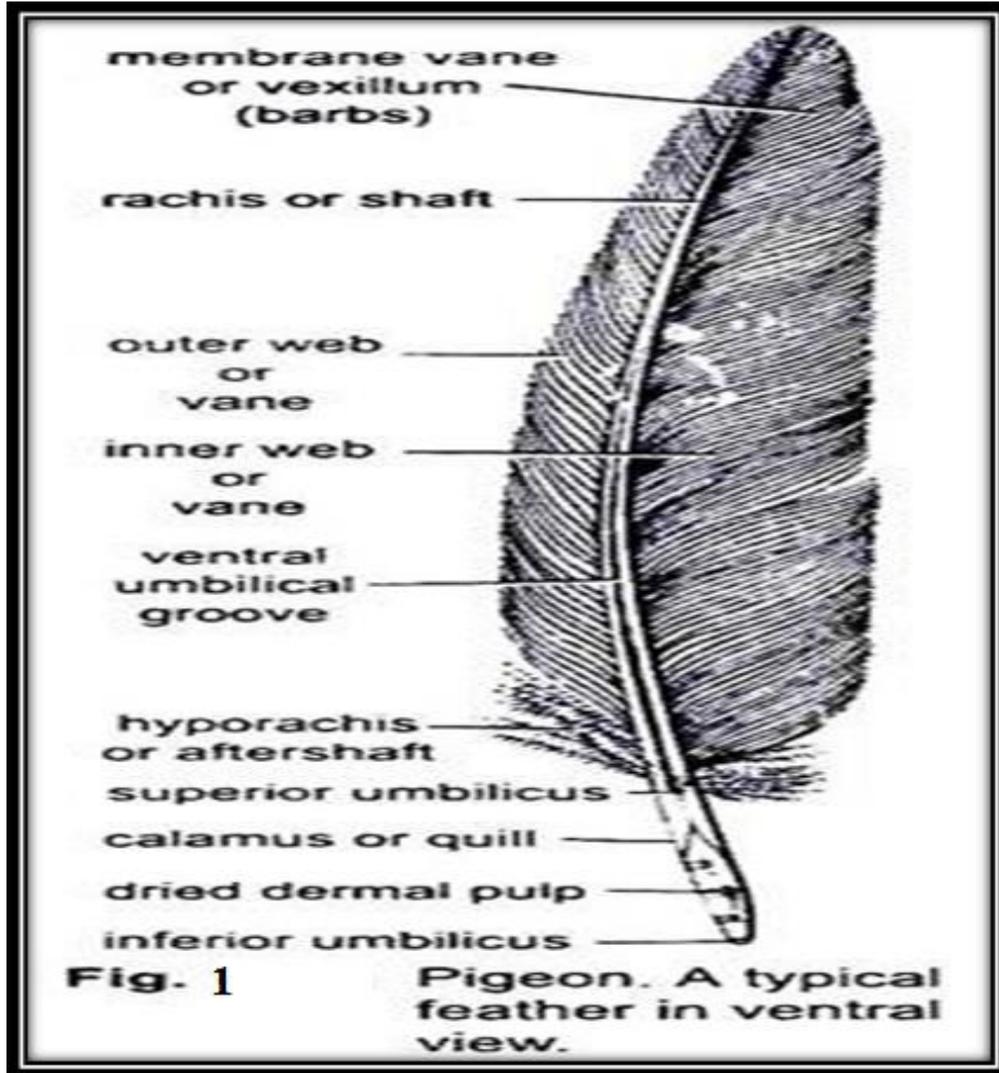
Birds are easily recognised group of vertebrates. In birds every part of the body is modified to suit their aerial mode of life. Birds possess feathers, beak and feet modified in relation to their aerial life. The Pigeons are flying birds. They are known both as wild and domesticated forms. The Pigeons are seen both in tropical and temperate zones. About 10 species of Pigeons are found in India. The pigeons fly in flocks and roost together. The pigeons are provided with long powerful wings which are well adapted for swift and strong flight on the earth.

The entire body of pigeon is covered with a close and continuous covering of feathers, which constitutes the plumage. They are light, strong, elastic, water proof and show many colours due to pigments of various shades as well as due to iridescence and structural arrangements.

### **Structure of a Typical Feather in Pigeon:**

To understand the structure of a feather, a contour feather which occurs on general body, wing and tail, can be considered as typical. A typical contour feather consists of a **central axis, main stem or scapus** and an expanded distal portion, the **vexillum or vane**.

**1. Scapus (Axis):** The scapus is divided into a basal portion, the **calamus** and an **upper shaft or rachis**.



### (a) Calamus:

The calamus is hollow, tubular and semitransparent. The base of calamus remains inserted into a pit or follicle of the skin, from which non-striated muscle fibres pass to the feather and provide movement to each contour

feather. The calamus opens below by a small opening called **inferior umbilicus**, which receives a small, conical, nutritive dermal papilla from the dermis.

The nutrients and pigments are passed through the dermal papilla into the feather from the dermis, during the development of feather. Another pore, called **superior umbilicus**, occurs on the ventral side of junction of calamus and rachis.

In flightless birds like cassowary, emu and extinct *Dinornis*, the after shaft is as long as the main feather, from which it arises. In some pigeons and many other birds, a small tuft of soft down feather, called after shaft or **hyporachis**, occurs near the superior umbilicus and covers it.

### **(b) Rachis:**

The part of the scapus above the **calamus** is a solid **rachis**. It forms the longitudinal axis of the vane. It is solid, opaque, roughly quadrangular in transverse section and filled with a closely packed mass of pith cells. A longitudinal furrow, the umbilical groove, runs along the ventral or inner surface of the rachis throughout its length.

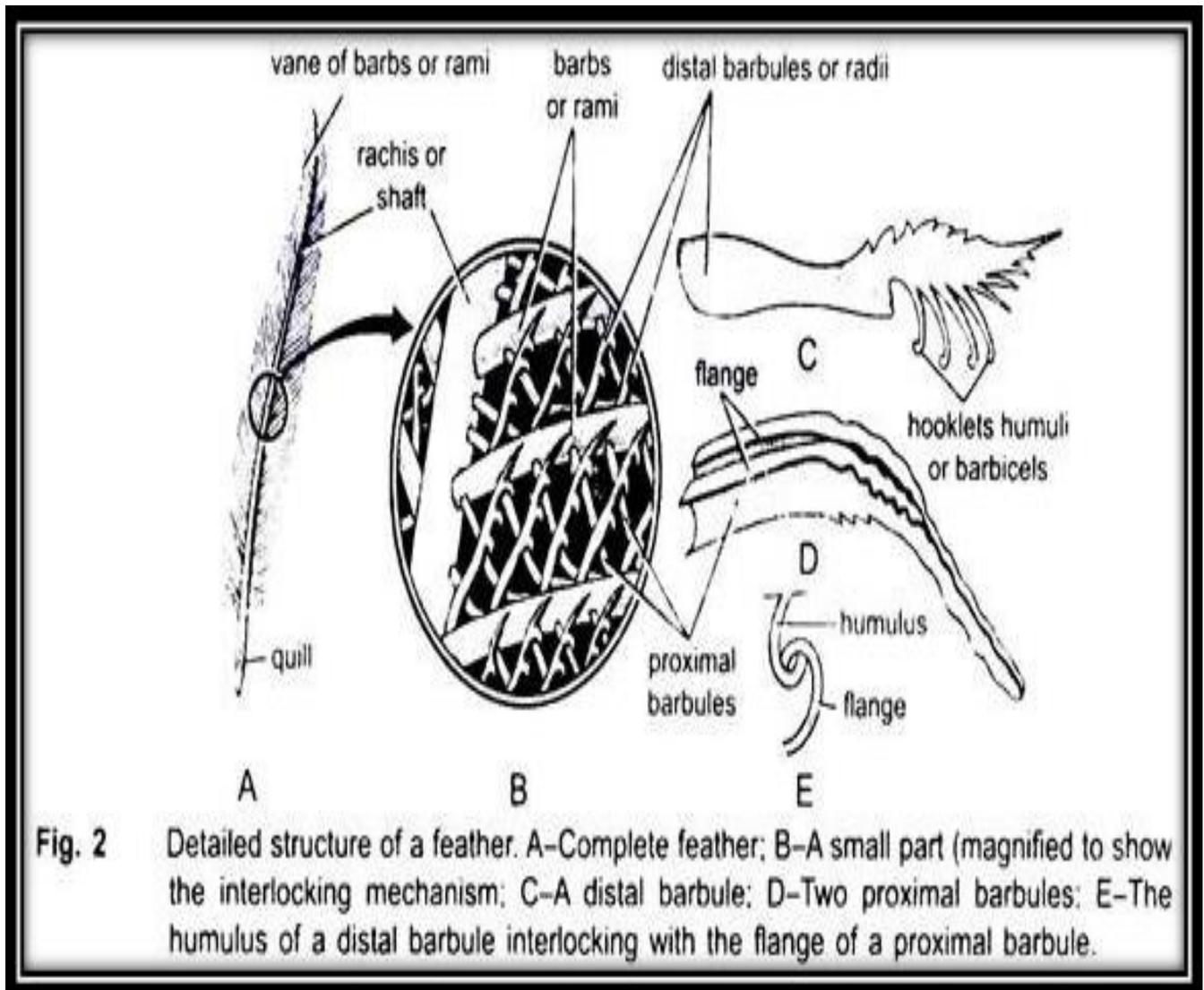
**2. Vane:** The rachis bears a fan-like, webbed or the expanded membranous part of the feather, the **vexillum** or **vane**. The vane is divided by rachis into two unequal lateral halves. Its proximal end is broader than the distal end. Each half of vane is composed of a series of numerous

(about 600), narrow, parallel, closely spaced, delicate, lateral, thread-like structures called the **barbs or rami**. The barbs arise obliquely outwards from the two lateral sides of the rachis.

The size of barbs gradually decreases towards both the ends of the rachis. Each barb on either side bears a fringe of small, extremely delicate, oblique filamentous processes, the **radii or barbules**. The barbules are of two types- proximal barbules directed towards the base of feather and distal barbules directed towards the tip of feather.

The lower edge of distal barbules bears minute, hamuli, barbicels or hooklets and the upper edge proximal barbules are deeply curled or rolled to form a groove and flange. Hooklets of distal barbules hook over the grooved edges of proximal barbules binding the barbs together.

With this limited sliding interlocking arrangement, all the barbs and barbules are loosely held together, so that the vane forms a flexible, firm, wide, flat and continuous surface for striking the air during flight. This interlocking mechanism can be broken down so that the barbs become separate, but can be joined again by “preening” the whole feather.



The feathers of ostriches and kiwis lack this interlocking mechanism of feathers of pigeon. The barbs and barbules of after shaft have no hooklets or barbicels. Feathers are always shed or moulted at regular intervals, as a rule annually after the breeding season. Some species of birds have a second lesser moult later on. During moult the old feathers drop out and new ones are formed from the same papillae. There is an elaborate hormonal control of the moult, basically by the thyroid.

-----Cont.