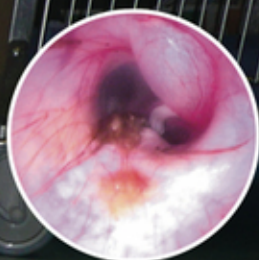
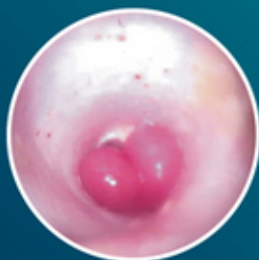


Atlas of Ear Diseases of the Dog and Cat

Sue Paterson and Karen Tobias



ATLAS OF EAR
DISEASES OF
THE DOG AND CAT

For Richard, Sam and Matt

ATLAS OF EAR DISEASES OF THE DOG AND CAT

SUE PATERSON

&

KAREN TOBIAS

 **WILEY-BLACKWELL**

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FOREWORD

My interest in ear diseases began during my first job as a new veterinary graduate in Florida, in 1978. It seemed as if almost every other dog that I saw had ear disease. In those days, otic medications were limited and ear problems rarely came under control easily.

Over the last 34 years, my interest in trying to understand ear disease has led me to write 2 ear disease books, lecture at over 350 veterinary conferences worldwide, help develop diagnostic and therapeutic tools, and teach veterinarians to use video otoscopy in their practices. I have had the honor of lecturing with Sue Paterson and in my opinion, she has an amazing way of captivating an audience with such an obscure topic as ear diseases.

The evolution of improved otic diagnostics allows us to actually see and work in the ear canal much easier than in the past. We are now able to identify tumors and middle ear disease, which are quite prevalent in both dogs and cats. New treatments of ear diseases in the dog and cat based on scientific evidence help our patients recover faster. Our pet owning clients are grateful to us for the comfort of their pets.

Through a collaborative effort, many veterinarians both in academia and in private practice have chosen to pursue

their interest in veterinary otology bringing new ideas, exciting research, new drugs, and new surgical techniques, such as laser surgery, to the practice of otology. In their important contribution to the veterinary literature, Sue Paterson and Karen Tobias share with us a detailed atlas based upon their clinical experiences to help us understand the anatomy, physiology, and pathogenesis of ear disease. Sue Paterson also shares with us her unique knowledge as well as her experience in the area of hearing and audiology in the dog.

As our profession changes, we should strive to improve our diagnostic skills to survive in the competitive environment that exists presently. Learning about ear disease, acquiring the knowledge and the skill necessary to do good ear work serves to increase the value of you personally as an animal healer. Proper ear disease treatment will solidify your clients to your veterinary practice. The value of otology cannot be overemphasized in today's small animal practice.

Louis N. Gotthelf, DVM
Montgomery, Alabama USA

PREFACE

It has been suggested that ear cases may make up more than 10% of the typical companion animal veterinarian's case load, so the ability to manage ear disease well is essential for the primary care veterinarian. Otology is one of the most rapidly expanding branches of small animal medicine and surgery and although there are many excellent textbooks already available on this subject, this is the first – and I hope one of the most complete – illustrated atlases of ear disease. I am grateful that Wiley-Blackwell has indulged my fascination for ear disease by allowing me to compile it. Ear disease for me is a passion: not only is it the challenge to diagnose and treat the dogs and cats that present to me every day in the clinic but also the challenge to pass on knowledge to fellow professionals, so that the care of ear disease in the species we deal with can be improved. The pain that otitis can cause is in my opinion often underestimated. Frequently it is only after medical therapy has resolved disease, or radical surgery has removed an ear

canal, that owners can recognise how much discomfort their pet has been in, as they perceive dramatic changes in their dog's or cat's behaviour. Ear disease should never go untreated; even with the financial constraints placed on us by many of our clients we have a duty to make animals with otitis comfortable.

Working with Karen Tobias, a true goddess of surgery, has been a joy and an honour and to be able to include her enormous wealth of surgical experience in this book has enhanced it hugely. I recognize that she has spent hours preparing pictures and text that will hopefully help guide inexperienced clinicians through basic techniques and provide detailed explanation for the more experienced surgeons of the more complex procedures. I know she has enjoyed preparing her sections of the book as much as I have mine. Thanks, Karen.

Sue Paterson

ACKNOWLEDGEMENTS

There are numerous people who have helped and guided me throughout my dermatological career; however, the person who must take the most responsibility for kindling my interest in ear disease is Craig Griffin, a true master of his art and an inspirational teacher. Thanks must go to my two business partners, Ian and Duncan who as surgeons have indulged my dermatological madness for years. I hope all the dermatology nurses at work, strictly alphabetically Bernie, Charlotte, Emma and Lydia, know how much I appreciate them; without their hard work my life would be impossible. And of course Janie my practice manager and friend, she knows I can't manage without her. Finally a huge thanks to all the loyal referring veterinary surgeons who provide me with one of the most rewarding day jobs you could ask for and of course all the material for the book.

Sue Paterson

Doing a total ear canal ablation and bulla osteotomy in a greasy Cocker Spaniel is a lot like cleaning the bathroom – the procedure is not always pleasurable, but the product is much more tolerable. Writing can be like that as well – the impetus to start the process is not always present, and sometimes the distractions prove stronger than the will to persist with the task at hand. In the end, though, the promise of a useful, attractive and educational text provides the drive needed to get the job done. I am grateful to Sue Paterson for providing that promise – who else but a dermatologist would be so excited about greasy Cocker Spaniels? I would also like to acknowledge my administrators and co-workers at University of Tennessee College of Veterinary Medicine for supporting me in this endeavour. Special thanks to photographers Phil Snow and Greg Hirschoren for their contributions and Deb Haines for her contract work and finalization of the images. And, as always, a big thanks to my two talented and attractive offspring, Jacob and Jessica, for their love and encouragement. Ears to you!

Karen Tobias

CHAPTER 1

ANATOMY OF THE EAR

Karen Tobias

1.1 External Ear: Pinna and Ear Canal	1	1.3 Middle Ear of the Cat	11
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1.1 EXTERNAL EAR: PINNA AND EAR CANAL

The *pinna* is the most prominent portion of the external ear (Fig. 1.1). It has an inner, concave surface and an outer, convex surface. In the standing ear, the concave surface forms a conchal cavity that is directed rostrally or laterally, while the convex surface faces medially or caudally. The distal tip of the pinna is called the *apex*, and the lateral and medial free margins of the pinna are called the *helix* (Fig.

1.2). The rostralateral boundary of the distal portion of the ear canal is called the *tragus*. A notch caudal to the *tragus*, the *intertragic incisure*, separates it from the *antitragus*, which is a thin elongated piece of cartilage that extends up to the lateral margin of the helix at the *cutaneous marginal pouch*.

The margins of the pinna are divided into medial, or rostral, and lateral, or caudal (see Fig. 1.1). These variations in directional description can make the anatomy very confusing.

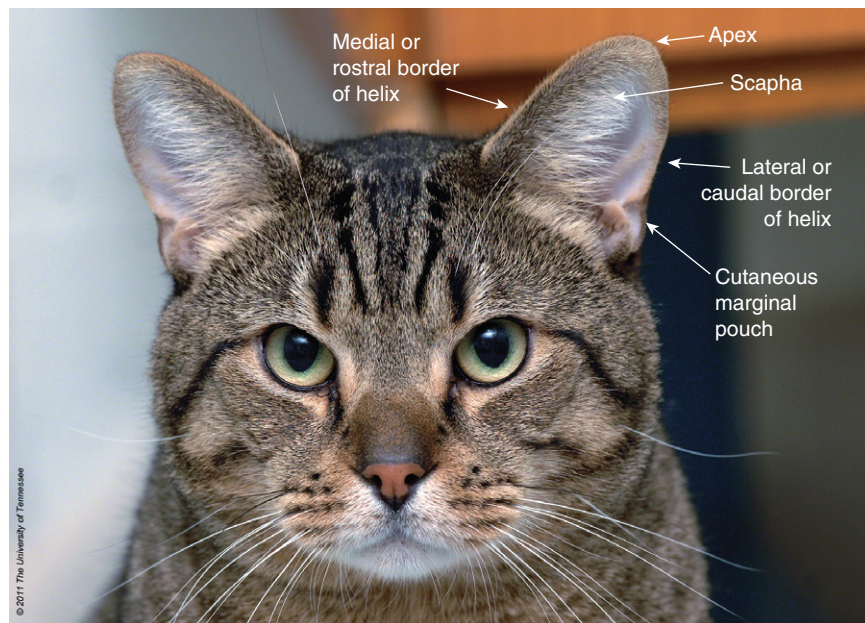


Figure 1.1 General anatomy of the pinna. The conchal cavity of the concave surface of the ear can be directed rostrally or laterally. (Photo by Phil Snow, UTCVM) © 2012 The University of Tennessee.

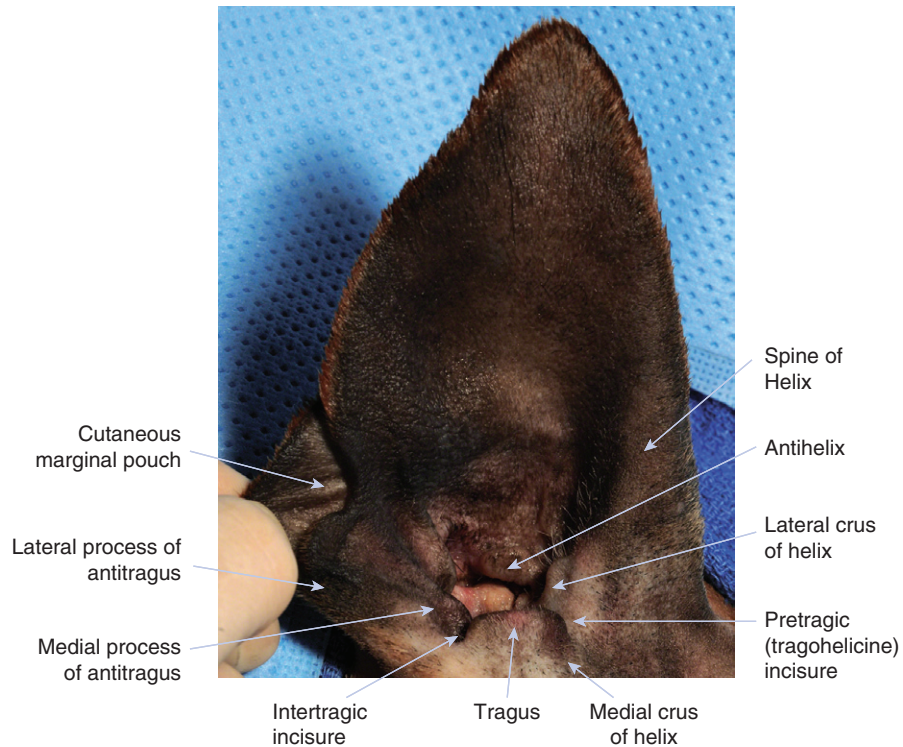


Figure 1.2 Concave surface of the right dog pinna. The antihelix and tragus form the boundaries of the ear canal opening. (Photo by Phil Snow, UTCVM) © 2012 The University of Tennessee.

The external ear is composed of three cartilages: *annular*, *auricular*, and *scutiform*. The ear canal is formed proximally (near the skull) by the annular cartilage and distally (away from the skull) by the auricular cartilage, which fans out to form the pinna (Fig. 1.3).

The auricular cartilage is divided into three sections: the *scapha*, the *concha*, and the *tubus auris*, or conchal tube (Fig. 1.4). Whereas the scapha is distally located and flattened, the concha is rolled into a trumpet shape to form the conchal cavity (Fig. 1.5). The scapha and concha are divided on the concave surface by the *antihelix*, a transverse cartilaginous fold.

The concha forms a funnel shape that thickens proximally as it becomes the *conchal tube*. The conchal tube forms the *vertical ear canal*. This canal is up to an inch (2.5 cm) deep and, as it progresses proximally towards the head, is directed ventrally, medially, and slightly rostral, spiralling inwards. It is partially surrounded along its proximal lateral border by the parotid salivary gland.

The annular cartilage is a separate, rolled, cartilaginous band that fits inside of the base of the conchal tube. It forms the *horizontal ear canal*, which runs medially toward the skull. In turn, the annular cartilage overlaps the osseous external acoustic meatus. Junctions of the auricular and annular cartilages and the annular cartilage and skull are

connected by a fibrous tissue sheath. Because of these moveable joints, the auditory canal can be straightened during otoscopic examination. Epithelium lining the auricular and annular cartilage contains sebaceous and ceruminous glands and hair follicles (Fig. 1.6).

Terminology for the ear canal varies within and amongst texts. Some authors consider the osseous extension of the skull that encompasses the tympanic membrane to be the *external acoustic meatus* or *osseous external acoustic meatus*, while others consider the external acoustic meatus to be the opening of the conchal tube at the level of the tragus and antihelix. The cartilaginous tube that extends from the meatus to the concha, which is a combination of conchal tube (auricular) and annular cartilage, is sometimes called the *auditory canal*.

A variety of muscles attach the ear rostrally, ventrally, or caudally to the head (Fig. 1.7); these muscles are innervated by the facial nerve. Some of these muscles are continuous with the cervical portion of the platysma. The plate-like, L-shaped scutiform cartilage, which is medial to the auricular cartilage, lies within the muscles that attach the auricular cartilage to the head (Fig. 1.8). By acting as a fulcrum, the scutiform cartilage improves mobility of the auricular cartilage.

The major portion of the blood supply to the external ear comes from the caudal auricular artery, which arises

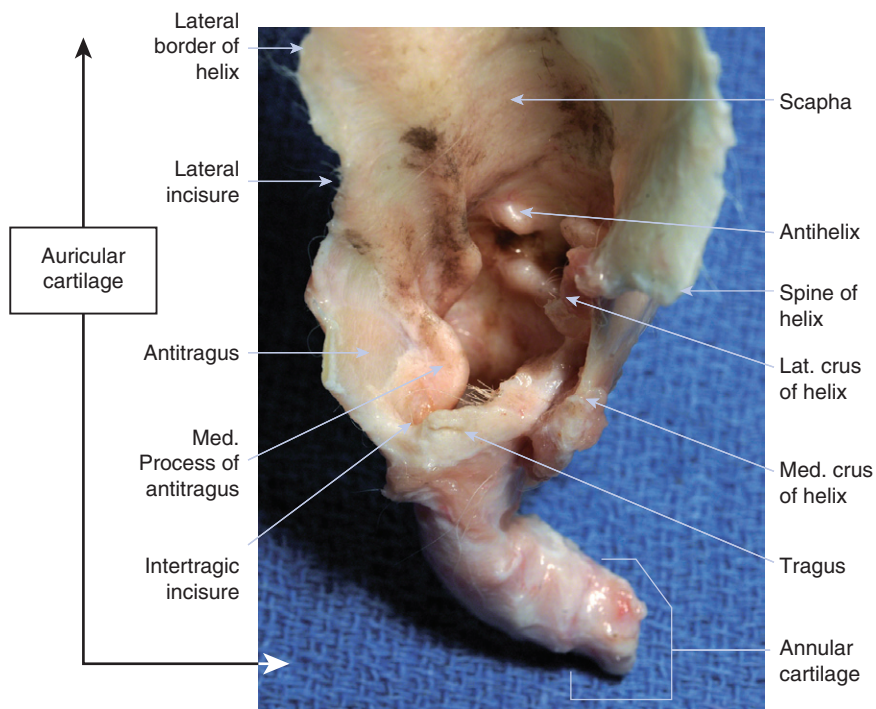


Figure 1.3 Auricular and annular cartilage of the right ear of a dog, lateral view. (Photo by Phil Snow, UTCVM) © 2012 The University of Tennessee.

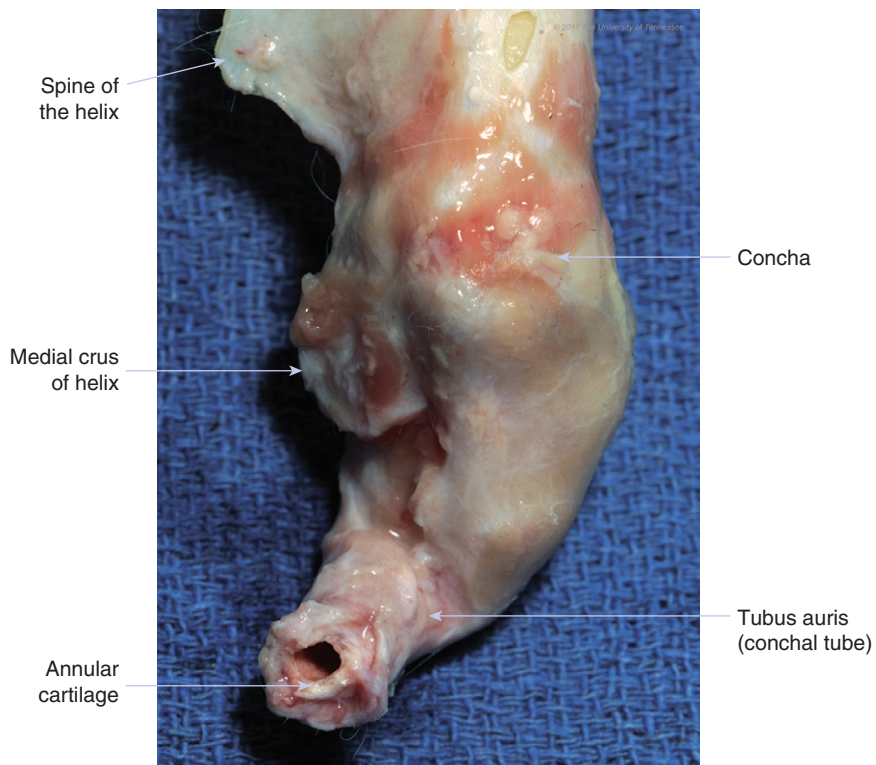


Figure 1.4 Auricular and annular cartilage of the right ear, caudal view. The annular cartilage is nestled within the auricular cartilage, which forms the pinna and vertical ear canal. Note that the proximal portion of the auricular cartilage spirals inward as it bends. (Photo by Phil Snow, UTCVM) © 2012 The University of Tennessee.

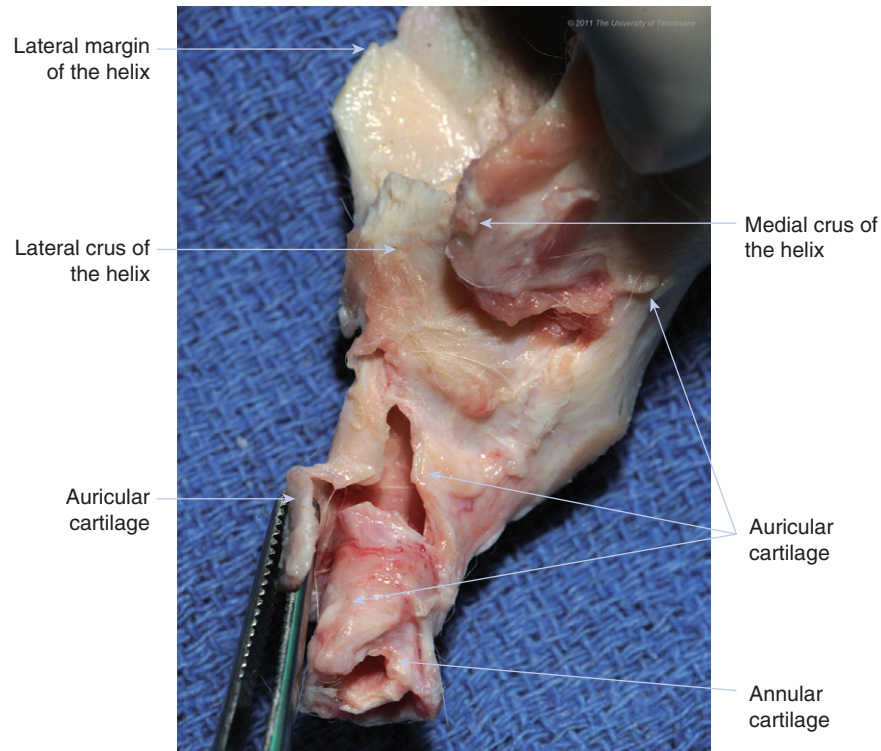


Figure 1.5 Medial view of cartilage of the right ear. A portion of the auricular cartilage that forms the conchal tube has been elevated; underneath is another extension of auricular cartilage that wraps around the annular cartilage. Note that the ear canal is not a solid funnel: the auricular and annular tubes are each formed by overlapping flaps of cartilage that allow flexibility. Animals with severe otitis externa or conchal obstruction may develop periauricular abscesses from disruption of the fibrous connective tissue sheath surrounding either the tube flaps or the auricular-annular or annular-osseous junction. (Photo by Phil Snow, UTCVM) © 2012 The University of Tennessee.

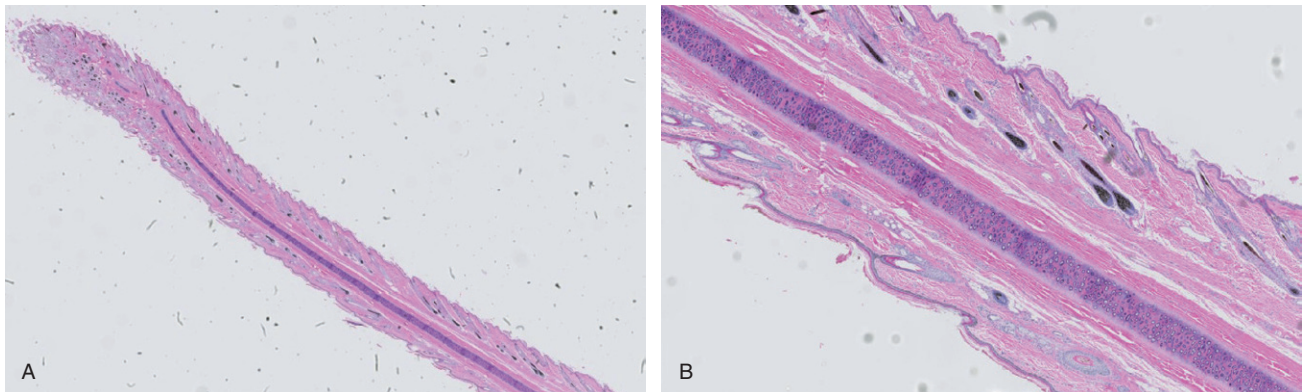


Figure 1.6 (A), Cross-section of the pinna of a dog. (B), Components including hyaline cartilage, muscle, and hair follicles are easily visible. (Courtesy, UTCVM Virtual Microscope) © 2012 The University of Tennessee.

from the external carotid artery at the base of the annular cartilage and medial to the parotid salivary gland (Fig. 1.9). The caudal auricular and superficial temporal veins, which terminate at the maxillary vein, provide drainage of the external ear (Fig. 1.10). Perforations in the auricular carti-

lage permit passage of blood vessels and nerves from the convex to the concave surface.

Sensory innervation to the concave surface of the pinna is provided primarily by branches of the facial nerve (Fig. 1.11) and, at the rostral extent of the pinna, by branches of

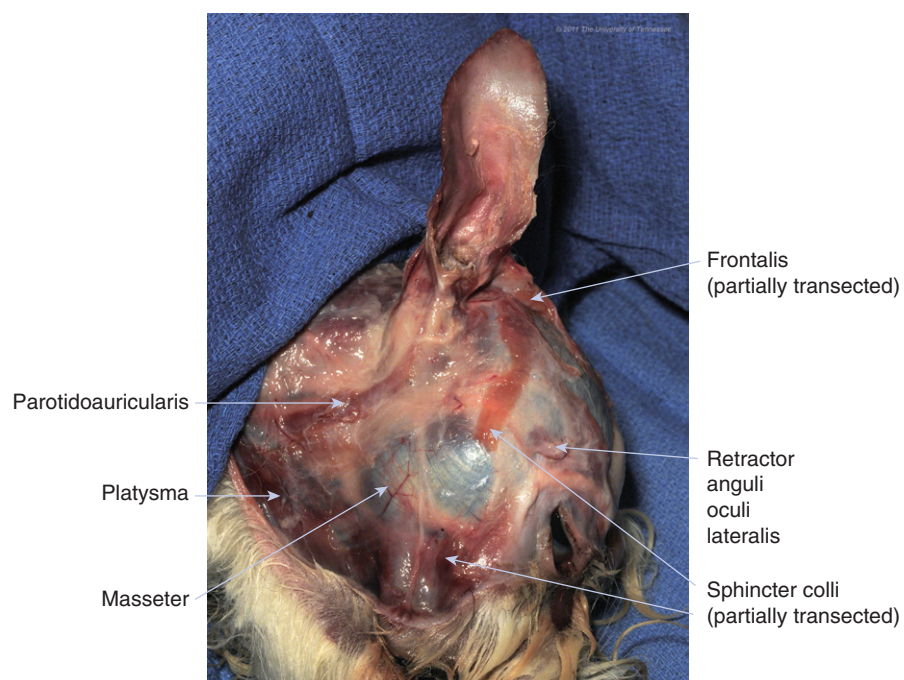


Figure 1.7 Muscles of the canine ear and face: right lateral view. (Photo by Phil Snow, UTCVM) © 2012 The University of Tennessee.

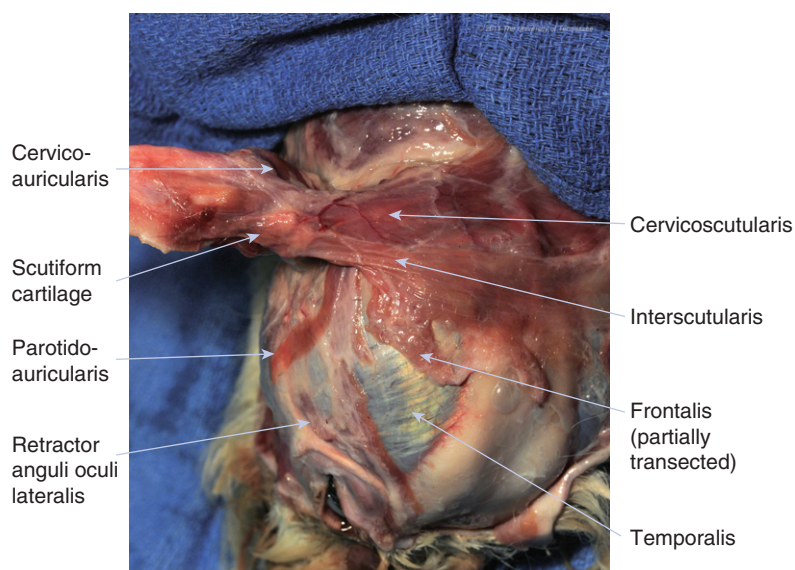


Figure 1.8 Muscles of the canine ear and head: dorsal view. The scutiform cartilage is enveloped within the dorsal group of muscles. (Photo by Phil Snow, UTCVM) © 2012 The University of Tennessee.

the trigeminal nerve. The lateral auricular branch of the facial nerve provides sensation to the majority of the vertical canal, along with a portion of the horizontal canal, while the auriculotemporal branch of the trigeminal nerve provides sensory innervation to the horizontal canal and tympanic membrane. The convex surface of the pinna receives sensory innervation via the second cervical nerve.

Communications between vagal and facial nerve branches may also be present.

1.2 MIDDLE EAR OF THE DOG

The canine middle ear (Figs 1.12 and 1.13) consists primarily of an air-filled tympanic cavity that is separated from