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A Philosophical Approach to Establishing a Diagnosis

Lesions in the oral cavity of veterinary species are common, and the pathologist's correct diagnosis can play an important role in the well-being of animals and owners alike. Unfortunately, multiple factors can conspire to make the diagnosis of oral and maxillofacial lesions difficult: some oral lesions can be rare and one-of-a-kind, lesions may require extensive decalcification, the existing literature is arguably less comprehensive for oral diseases than for other body systems, and perhaps most importantly, oral lesions with markedly different outcomes can demonstrate coalescing morphologic features. It is the authors' opinion that the factors that make these lesions challenging to diagnose can also make them intellectually attractive, and the pursuit of the most appropriate diagnosis a rewarding one. This book was written with this concept ever in mind.

While lesions in the oral cavity can share multiple morphologic features with lesions in other body systems, some oral lesions are absolutely unique and may be found nowhere else. In addition, pathologic lesions arising from the jaw can also be unique, as maxillary and mandibular bone tissue is embryologically and physiologically unlike bone of the appendicular skeleton. Perhaps most importantly, the oral cavity and jaws of higher vertebrates include teeth, the sole anatomic structures that bridge the skeletal and digestive systems.

One of the most important goals for a diagnostic pathologist is to establish the correct diagnosis – *to put the right lesion into the right categorical box*. To accomplish this, veterinary pathologists have long utilized the framework of human oral disease as a template for organizing the oral lesions of veterinary species. While humans and veterinary species share certain features of oral pathophysiology, it is the authors' opinion that oral lesions that occur in human beings do not fully capture the great diversity of pathology that occurs in veterinary species. Likewise, many clinicopathological entities in humans are defined or subclassified by specific demographic, behavioral, and/or environmental factors that are unlikely to be significant in animals.

Diagnosis is a form of *categorization,* and the process of categorization is a human construct. We created *categorization* as a means of dividing up the natural world. Making sense of veterinary oral pathology through categorization is a process that has been going on for more than a century, and many individuals have made important contributions to this effort. Unfortunately (or perhaps fortunately), nature is highly complex. Because this effort to diagnose and categorize is a difficult one, it is essentially an iterative process, and such attempts will always remain works in progress.

In order to establish a diagnosis, many pathologists adhere to a heuristic process of morphologic pattern recognition. For the experienced pathologist, this cognitive process may even occur at a level beyond conscious recognition. The diagnosis *just feels right*. Although the end goal of establishing a correct diagnosis may be met, a dependency on the process of pattern recognition alone remains an imperfect one, as oral lesions can and frequently do share overlapping morphologic features.

Bell curves can be constructed as simple, two-dimensional metaphors representing the diversity of morphologic types found within a particular type of lesion (Figure 1.1). For such curves, the diversity of a particular morphologic feature or collection of features within a lesion can be represented along the x-axis, while the frequency of occurrence of those features in a population of lesions is mapped along the y-axis. In such a system, a steep and narrow bell curve suggests that relatively little morphologic diversity exists within the lesion type, while a broad-based bell curve suggests the opposite. Superimposition of these curves graphically demonstrates this concept of overlapping morphologic features (Figure 1.2). Structural overlap between lesions presents a diagnostic challenge for the pathologist and is a concept that will be returned to throughout this book.

It is the opinion of the authors that the examination of histologic features frequently allows the designation of a principal diagnosis along with one or more differential diagnoses. These differential diagnoses are important

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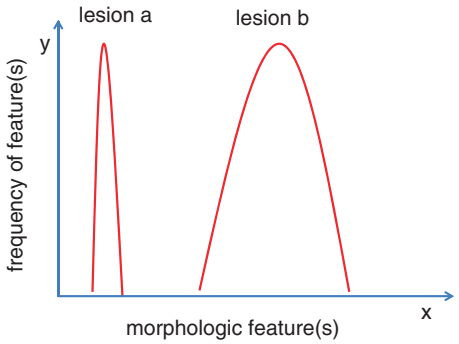

Figure 1.1 Bell curves representing lesion diversity and frequency. For a given lesion, the *x*-axis can represent a single morphologic feature or set of morphologic features that collectively comprise the lesion in question. The *y*-axis represents how common the particular morphologic feature(s) is/are within a group of similar lesions; lesions with a broad curve are morphologically diverse and therefore more difficult to diagnose.

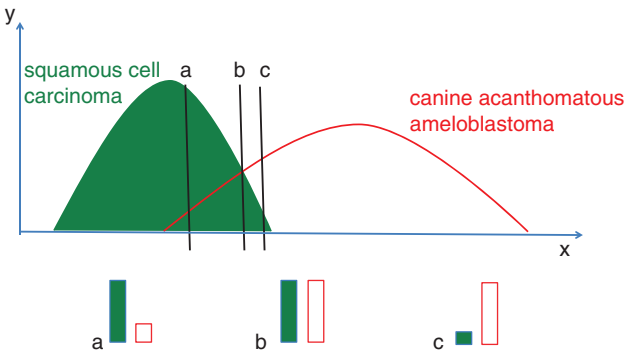

Figure 1.2 Superimposed bell curves are a metaphor for the morphologic overlap between related lesions. Some lesions, like squamous cell carcinoma (SCC) and canine acanthomatous ameloblastoma (CAA) can either be morphologically distinct lesions (extreme right and left edges of the two bell curves) or share multiple features (within the region of curve overlap). Sections a, b, and c represent lesions that are most likely to be SCC, equally likely to be SCC or CAA, or more likely to be CAA, respectively.

and should be included in the report sent to the submitting clinician. Assigning a principal diagnosis and accompanying set of differential diagnoses effectively conveys a measure of ambiguity, which may have great value for the clinician. For these reasons, histologically related lesions (differential diagnoses) have been included for each lesion type described in this book.

To assist in this difficult but ultimately rewarding endeavor, the judicious use of appropriate immunohistochemical assays and/or special stains can be invaluable to inform the final diagnosis. Perhaps even more importantly, clinical data, most typically available through the submitting clinician, should be sought out. Patient signalment, anatomic location, and lesion natural history can be invaluable facets of the final diagnosis. Radiographic imaging studies and/or three-dimensional imaging studies like computed tomography may be available. The opinion of the clinician/ radiologist regarding such studies, or better yet, the diagnostic images themselves, should be reviewed by the pathologist in conjunction with the gross and histological features of the submitted sample.

If not openly offered, the opinion of the submitting clinician should be sought out, as an astute clinician will often have made a preliminary clinical diagnosis prior to submission. This *clinical diagnosis* may be correct, based upon the clinician's experience, the anatomic location, results of diagnostic imaging studies, signalment of patient, clinical signs, and prior biopsy results. The diagnosis of relatively common oral lesions such as odontogenic cysts and equine cementomas (nodular hypercementosis) are highly dependent upon their anatomic relationship with teeth, jawbones, and/or the paranasal sinuses. Some clinicians have a curious policy of withholding such information from the pathologist in a dubious attempt to "not influence the diagnostic process." It is likely that these same clinicians would be at a loss if their own clients withheld important clinical information for the same reason.

There is also value in seeking out the opinions of colleagues or even trainees. At academic institutions, such opinions are typically readily available, and such advice may even be offered without asking for it! Useful discussions can also occur in the setting of private diagnostic labs, even in those laboratories staffed by a single pathologist. The common use of digital images facilitates rapid communication, and networks of colleagues around the world are often willing to lend a hand. Finally, following a challenging lesion *down the road* can be a valuable learning experience in itself. Does the eventual clinical outcome fit the diagnosis, and most importantly, can one learn from it?