

Human Anatomy in Cinema

La Anatomía Humana en el Cine

Adriano Ferreira da Silva¹; Catia Helena de Almeida Lima Massari² & Edson Aparecido Liberti³

DA SILVA, A. F.; MASSARI, C. H. A. L. & LIBERTI, E. A. Human anatomy in cinema. *Int. J. Morphol.*, 41(5):1421-1426, 2023.

SUMMARY: A corpse is the body's final destination and, as a social construction, it challenges Western cultural taboos and practices around the corpse, having been shown in cinema. The present paper aims to analyze 17 films that portray Human Anatomy, identifying which themes specifically related to morphological sciences are addressed, namely: a) reactions to first contact with a cadaver, b) medical school and dissection classes, c) origin of cadavers, d) anatomy and suspense or horror movies, e) romance, drama and comedy, f) body snatchers/resurrectionists, g) anatomical techniques, h) racism, prejudice and anatomy. This is a critical review of films in which, after thorough triple-blind analysis by the authors, it was observed that the encounter with the cadaver provides a series of emotions to the characters participating in the practical anatomy classes shown in the films, such as apprehension, fear, disgust, curiosity, etc. Generally, this surprising contact between the living and the dead is associated with the practice of dissection, which often results in the accentuation of emotions previously reported. From all this, it is concluded that the history of the teaching of Human Anatomy has been interestingly portrayed in cinema from different points of view.

KEYWORDS: Medical Education; Gross Anatomy; Corpse; Cadaver; Movies.

INTRODUCTION

Culture is not what you see with your eyes, but what changes the way you look at the world around you. Film culture is intertwined with the teaching-learning process of anatomy in that cinema portrays the human cadaver in scientific and forensic investigation. Popularly, a good cinephile is the one who assimilates well the movies watched by remembering certain sequences of images and, therefore, this characteristic is also present in a good anatomist. A corpse is the body's final destination and, as a social construct, it challenges Western cultural taboos and practices around the corpse, having been shown in cinema (Sánchez-Biosca, 1993; Foltyn, 2008; Passetti, 2015; Zwart, 2015).

Since the short film just two seconds long shot by the inventor of an early motion-picture camera, Frenchman Louis Aimé Augustin Le Prince, on October 14, 1888, and the first public showing of films by the Lumière brothers on March 22, 1895, cinema has remained a medium of entertainment and information as it incorporates everyday events and human creations, whether documentary or

fantastic (Bezerra, 2023). In this way, the seventh art, as defined by Ricciotto Canudo, in 1923, is capable not only of representing reality, but also of creating something as real as it is artificial, constituting a powerful instrument that reaches people in a different way, given its ability to make the spectator move and reflect (Covaleski, 2009).

Among the different approaches to how science and scientist are represented at certain times by cinema, the association between science fiction and medicine stands out contents in which some film productions are framed whose themes directly or indirectly portray one of the foundations of medical science: Human Anatomy (Cunha & Giordan, 2009).

Thus, the present article aims to briefly analyze some films that portray Human Anatomy, identifying which themes specifically related to morphological sciences are addressed. It is warned here that this manuscript may contain spoilers of the movies studied.

¹ Radiologist doctor, PhD, University Hospital of the University of São Paulo, Postgraduate Program in Anatomy of Domestic and Wild Animals, Department of Surgery, School of Veterinary Medicine and Animal Sciences, University of São Paulo, SP, Brazil.

² Veterinarian doctor, PhD, Postgraduate Program in Anatomy of Domestic and Wild Animals, Department of Surgery, School of Veterinary Medicine and Animal Sciences, University of São Paulo, SP, Brazil.

³ Biologist specialist in Human Anatomy, PhD, Senior Professor at the Institute of Biomedical Sciences at the University of São Paulo. Coordinator of the Cultural Development Center of the Butantan Institute, SP, Brazil.

MATERIAL AND METHOD

This study was developed in the University of São Paulo (USP), Brazil. Considering that there is a wide variety of genres produced by the film industry (action, biography, comedy, drama, history, fantasy, science fiction, romance, horror, documentary, etc.), this research starts from the following guiding question: what issues related to Human Anatomy are represented in movies that show corpses?

This is a critical film review, based on the analysis of the plot, the main actions and the historical context of the feature films watched, following the methodological precepts of Jahn (2021), Penafria (2009) and Caldwell (2011).

The film *Frankenstein* (1910) was chosen as the starting point. Thus, as inclusion criteria, films released until the year 2020 were studied. As exclusion criteria, documentaries and essentially didactic films were not included. In total, the object of research comprises 17 titles: *Frankenstein* (1910), *Frankenstein* (1931), *The Body Snatcher* (1945), *The Flesh and the Fiends* (1960), *La Vita di Leonardo da Vinci* (1971), *Gross Anatomy* (1989), *Mary Shelley's Frankenstein* (1994), *Anatomie 1 and 2* (2000, 2003), *Vital* (2004), *Grey's anatomy* (2005-), *Unrest* (2006), *Tales from the Crypt* (1989-1996), *Burke and Hare* (2010), *Drei* (2010), *The Physician* (2013), *Victor Frankenstein* (2015) and *M8 - When Death Rescues Life* (2020).

It is warned here that two films were not included in the research for not addressing the Anatomy itself, but they use it as a way to provoke amazement or terror in the viewer. They are: *Hollow Man* (2000) which shows the muscular system in the scenes in which the character becomes invisible and *Sleepy Hollow* (1999) which shows a scene in which the knight's skull reconstitutes itself showing the blood vessels, the bones of the head and the musculature.

Table I. Thematic categories related to morphological sciences.

	Thematic Category	Number of movies
I.	Reactions to first contact with the corpse	06
II	School of Medicine/dissections	14
III	Origin of corpses	07
IV	Anatomy and suspense/terror films	10
V	Romance/drama and comedy	08
VI	Body snatchers/ resurrectionists	03
VII	Anatomical techniques	02
VIII	Racism/prejudice and Anatomy	01
	Total number of films searched	17

After thorough triple-blind analysis by the authors according to Vasconcelos (2016), eight thematic categories were stipulated: a) reactions to first contact with the cadaver, b) medical school and dissection classes, c) origin of corpses, d) anatomy and suspense or horror films, e) romance, drama and comedy, f) body snatchers/ resurrectionists, g) anatomical techniques, h) racism, prejudice and anatomy.

RESULTS AND DISCUSSION

As a result, Table I was elaborated showing the number of films, among the amount researched, which fits the themes particularly signed by the authors. It is warned here that the same film can fit into several categories below, or even all.

It was observed, in all the material researched, that the encounter with the corpse provides a series of emotions to the characters participating in the practical classes of Anatomy shown in the films as, for example, apprehension, fear, disgust, curiosity, etc. Generally, this surprising contact between the living and the dead is associated with the practice of dissection, which often results in the accentuation of emotions previously reported.

A good part of the researched films addresses the body-corpse contact, reflecting curiosity and, at the same time, the whole range of emotions that arises when viewing a corpse for the first time in an Anatomy laboratory. In the book *First cut: a Season in the Anatomy*, literature professor Howard Carter reports the semester he spent watching first-year medical students studying in a human anatomy laboratory. From the initial attempts of the incisions on the back, the symbolic weight of extracting the heart and, in the end, the curious mapping of the brain, one embarks on a path that is both frightening, impressive and, finally, redemptive (Carter III, 1997). In turn, in the book *Dissection: photographs of a Rite of Passage in American Medicine 1880-1930*, John Harley Warner and James M. Edmonson point out that the photographs of dissections were taken from the shadows of history, where you can at least witness a blood-soaked dissection table that makes you want to look away from the students' black humor and gaze while playing with skeletons at the same time hilarious and horrible (Warner & Edmonson, 2009).

Regarding the reactions to the first contact with the corpse presented in the films, one finds discomfoting behaviors, including fainting in *Mary Shelley's Frankenstein* (1994), *Unrest* (2006) and *Burk and Hare*

(2010). Also noted is discomfort over the use of formaldehyde and distress during the first dissection in *Gross Anatomy* (1989) and *Unrest* (2006). There is also, intrinsic admiration for the intricate complexities of the human body, with mixed sensations highlighted in the film *The Physician* (2013) which, although not specifically about Anatomy, presents one of the great dialogues between the physician Ibn Sina (Avicenna) and his apprentice (Rob Cole), who had dissected a corpse.

Ibn Sina: What is it like?

Rob Cole: Inside?

Ibn Sina: [nods]

Rob Cole: It is both... beautiful... and frightening.

Ibn Sina: Go on.

Rob Cole: I saw the heart!

Ibn Sina: Describe it.

Rob Cole: It has two chambers with an impassable wall in between.

Ibn Sina: So how does the blood get from one side to the other?

Rob Cole: By way of the lungs, I think.

Ibn Sina: So all our theories of human circulation would be... wrong.

Rob Cole: Master, nothing is as it is in the books! Nothing! (*The Physician*, 2013).

The documentary *La Vita di Leonardo da Vinci* (1971) relates the Renaissance artist's admiration and curiosity for the study of anatomy, showing that da Vinci's drawings (1452-1519) would have revolutionized medicine if they had been published at the time.

Most of the films are related to medical schools and students dissecting cadavers, especially in *Gross Anatomy* (1989), *Anatomie* (2000), *Vital* (2004) and *Unrest* (2006), showing the most diverse possible reactions, including in the Brazilian *M8* (2010), becoming the most popular view of anatomy classes. Interestingly, in Brazil, few colleges, for the most diverse reasons, allow undergraduate students to perform dissections; the most common is to study by already prepared anatomical pieces (prosections), many of them with several years of use. New trends in medical education have modified the role of dissection in teaching anatomy in today's medical schools. And besides, the movies popularized anatomy as the first and best-known part of the medical course, although today the discipline of macroscopic anatomy no longer exerts as much impact on students as in the past and has lost its workload in the curriculum of undergraduate courses worldwide (Parker, 2002; Elizondo-Omaña *et al.*, 2005; Aversi-Ferreira *et al.*, 2010; Comer, 2022; Romero-Reverón, 2022; Engelmann, 2022).

As for the origin of the corpses, this theme appears with some frequency in the films addressed. The provenance of the corpses dates back to the death penalty of alleged criminals by hanging in Mary Shelley's *Frankenstein* (1994) and *Burk and Hare* (2010), passing through indigent corpses in the films *Unrest* (2006) and *M8* (2020) where, incidentally, these last films open a debate on the origin of unidentified/unclaimed corpses. In one of the lines in the film *Unrest* (2006), the technical characters of the laboratory question: "who would donate the body of a loved one to an anatomy laboratory?" and shall advise: "if you see on your driver's license an item to donate your body to Science, don't sign". Such advice represents a disservice to the current Anatomy, in fact. However, there are films that show legally donated corpses, as in *Gross Anatomy* (1989), *Vital* (2004), and *Drei* (2010). In *The Physician* (2013), a patient practicing the Zoroastrian religion, who regards the dead body as an empty vessel, donates his body for Avicenna's assistant, Rob Cole, to dissect. In *Vital* (2004), the protagonist's girlfriend donates her body to the anatomy lab and ends up being dissected by the main character. By the way, this Japanese film is one of the few that shows the final destination of the anatomical remains with a religious ceremony.

In relation to the study of Anatomy present in suspense/horror films, it can be seen that although the presence of corpses in anatomy laboratories can lead to the creation of films of this genre, curiously enough, there are few horror and suspense films that address this theme. This is verified, specifically, in *Anatomie* (2000) and in *Unrest* (2006). The vast majority of horror films, especially about the reanimation of bodies (zombies), take place in cemeteries and morgues and seem to occur only with fresh corpses. It is assumed by this that the fixed ones seem not to be suitable for the production of living dead. *Unrest* (2006) proclaims itself as the first film to show real corpses.

Movies based on the book entitled *Frankenstein*, or *The Modern Prometheus* (Shelley, 1818), such as *Frankenstein* (1910, 1930), Mary Shelley's *Frankenstein* (1994), and *Victor Frankenstein* (2015), although not specifically about the study of Anatomy, make use of its concepts to build the monster with cadaver parts. In *Victor Frankenstein* (2015), the character Igor, a hunchback and abused clown in a circus, declares that he has a passion for Medicine, especially Anatomy, and after saving a trapeze artist, he gains the trust of the then medical student Victor Frankenstein.

Perhaps the most unusual of the Anatomy-related horror films is in the BBC series *Tales from the Crypt* (1989-1996). One of the episodes of the third season, from 1991,

is called *Abra Cadaver* and takes place in a hospital and, in part, in an Anatomy laboratory. Although it is unusual to associate romance/drama films with Anatomy, *Gross Anatomy* (1989) is a romantic comedy set in an anatomy lab. Still, it is considered one of the most faithful films in portraying the first year of medical school in the United States. Apparently, due to the fact that the students are young adults, the atmosphere of romance seems favorable, although some films appeal to eroticism as in *Anatomie part 1* (2010) and *part 2* (2003) and *Vital* (2004). These same films, in general, also report personal dramas faced by the characters such as the particular identification with the course and the issue of humanization in *Gross Anatomy* (1989) and the issue of guilt over the girlfriend's accident in *Vital* (2004), for example. Curiously, this last mentioned film has the most reliable dissections seen in a non-educational film, probably because they are real anatomical structures.

In the 17th and 18th centuries, body snatching reached epic proportions around the world. In the United Kingdom of the 18th century, medical schools used corpses of convicts. At the time, the ratio of students to convicts per year was around 2:5, a fact that worsened in the 19th century, when this ratio increased to approximately 100:5, which gave rise to the figure of the resurrectionists. A chapter apart in the history of anatomy, resurrectionists/body snatchers secretly removed cadavers from graves for sale to these medical schools, where they were used for practical anatomy classes through dissection. There was also, simultaneously, a proliferation of medical schools and the study of anatomy. Poor refrigeration methods meant a deficit of fresh bodies for medical study. The increasing demand for fresh cadavers gave rise to resurrectionists, men paid to dig up and deliver bodies. Resurrectionists used to work in teams, mainly targeting new graves because it was easier to dig up the unsettled earth. They used to send spies (usually women) to funerals to scout the grave and plan for the removal of the body. A particular target for resurrectionists was the mass graves that the poor were often buried in. These graves were left uncovered until they were full of coffins. Single graves were far more troublesome to break into – a tunnel would have to be dug, sometimes four feet down, the coffin broken into and the body carried to the surface. It became more common, especially in Europe, for the relatives of the deceased to watch over their graves and many means of prevention were developed, such as iron coffins, grave alarms and more famously the iron bar structure built around a coffin known as a *Mortsafe*. To try and contain the escalating situation, the 1832 Anatomy Act was passed in the United Kingdom, making it a crime to desecrate graves and steal corpses. The practice was tolerated by many medical practitioners and institutions

who believed it was a necessary evil, one that was offset by the benefits anatomical study of the bodies would produce (BODY, 2023).

The most extreme case of body snatching occurred when the resurrectionists William Burke and William Hare began to murder, usually beggars and the sick through suffocation (the act became known as burking). They sold the bodies to Dr. Knox of Edinburgh Medical School in Scotland. After denunciations, Burke surrendered, being hanged in the public square in 1829 and, finally, dissected in the faculty of Medicine; Hare was not punished (Barros Filho, 2016). Two films selected here tell this story: *The Flesh and the Fiends* (1960) and the dark comedy *Burke and Hare* (2010).

Perhaps the best known of the films on this subject is *The Body Snatcher* (1945). Although he does not directly address the case of Burke and Hare, he quotes them therefore after what happened to them. The story, a mixture of drama and romance, however fictitious, contains the same elements of the original story, but one of the modifications is the existence of a single killer.

As for anatomical techniques, it is known that the different ways in which methods are applied in order not only to preserve, but to better understand the structure of the human body, have been developing over time, and one of them is portrayed in the film *La Vita di Leonardo da Vinci* (1971), where it is shown how he included an eye in egg white and cooked, allowing that when cutting clear obtained a cross-section of the eye. Perhaps a rudimentary method, but undoubtedly an anatomical technique.

The sophisticated technique of corpse preservation developed and patented by Gunther Von Hagens in 1978, plastination, can be seen in two productions. The first is *Anatomie* (2000). In this horror film with doses of eroticism, a substance called promidal is injected into living individuals by a medical secret society in order to fix and produce excellent quality anatomical parts (in this case, the plastinated parts). The second film, the German drama *Drei* (2010), does not deal directly with Anatomy, but with complex human relationships. However, the mother of one of the characters, suffering from terminal malignant neoplasia, decides to donate her body to Von Hagens' laboratory. Later on, the son, while visiting an exhibition, he finds a plastinated and dissected corpse, which he thinks is his mother.

Finally, regarding the racism and prejudice perceived in Anatomy class, the Brazilian film *M8* (2020) tells the story of a poor black boy who enters medical school and suffers prejudice for it. He begins to realize that most

cadavers in anatomy (including his own) are black, and he begins to wonder why this is so. Curiously, he performs dissections in his classes, a fact unfortunately not much more routine for the approach to gross anatomy in Brazil, as mentioned before.

FINAL CONSIDERATIONS

In none of the films studied were scenes found that showed joking, disrespect, depreciation or jocosity towards the cadaver, and, when they were minimally about to happen, the perpetrators were reprimanded or punished. Unfortunately, facts like these were relatively common in the late 19th and early 20th centuries, according to the book *Dissection: Photographs of a Rite of Passage in American Medicine 1880-1930*, where students appear dressing cadavers, putting cigarettes in the cadaver's mouth or even making inverted poses (the cadaver dissecting the student) (Warner & Edmonson, 2009).

Also, it is important to point out that the famous medical series *Grey's Anatomy* (2005-), although it has its name based on Gray's Anatomy Textbook (Strandring, 2015), addresses very little Anatomy in its episodes, since the series is set with interns, doctors and surgery residents. From all this, it can be concluded that the history of the teaching of Human Anatomy has been portrayed in cinema from different points of view. Except for the documentary *La Vita di Leonardo da Vinci* (1971), no films about early modern anatomists, not even about Andreas Vesalius, were found in the present research, which represents a possible gap yet to be filled in the future cinematheque.

CONSULTED FILMOGRAPHY

Anatomie. Directed by Stefan Ruzowitzky. Parts 1 and 2. 2000, 2003.
Burke and Hare. Directed by John Landis. 2010.
Drei. Directed by Tom Tykwer. 2010.
Frankenstein. Directed by J. Searle Dawley. 1910.
Frankenstein. Directed by James Whale. 1931.
Grey's Anatomy. Created by Shonda Rhimes. 2005-.
Gross Anatomy. Directed by Thom Eberhardt. 1989.
Hollow Man. Directed by Paul Verhoeven. 2000.
La Vita di Leonardo da Vinci. Directed by Renato Castellani. 1971.
M8 – When Death Rescues Life. Directed by Jeferson De. 2020.
Mary Shelley's Frankenstein. Directed by Kenneth Branagh. 1994.
Sleepy Hollow. Directed by Tim Burton. 1999.
Tales from the Crypt. Directed by Freddie Francis. 1989-1996.

The Body Snatcher. Directed by Robert Wise. 1945.
The Flesh and the Fiends. Directed by John Gilling. 1960.
The Physician. Directed by Philipp Stölzl. 2013.
Unrest. Directed by Jason Todd Ipson. 2006.
Victor Frankenstein. Directed by Paul McGuigan. 2015.
Vital. Directed by Shinya Tsukamoto. 2004.

DA SILVA, A. F.; MASSARI, C. H. A. L. & LIBERTI, E. A. La anatomía humana en el cine. *Int. J. Morphol.*, 41(5):1421-1426, 2023.

RESUMEN: Un cadáver es el destino final del cuerpo y, como construcción social, desafía los tabúes y prácticas culturales occidentales en torno al cadáver, habiendo sido mostrado en el cine. El presente trabajo tuvo como objetivo analizar 17 películas que retratan la Anatomía Humana, identificando qué temas específicamente relacionados con las ciencias morfológicas se abordan, a saber: a) reacciones al primer contacto con un cadáver, b) clases de medicina y disección, c) origen de los cadáveres, d) anatomía y películas de suspenso o terror, e) romance, drama y comedia, f) ladrones de cuerpos/resurreccionistas, g) técnicas anatómicas, h) racismo, prejuicio y anatomía. Se trata de una revisión crítica de películas en las que, tras un minucioso análisis triple ciego por parte de los autores, se observa que el encuentro con el cadáver proporciona una serie de emociones a los personajes que participan en las clases prácticas de anatomía que se muestran en las películas, tales como aprensión, miedo, repugnancia, curiosidad, etc. Generalmente, este sorprendente contacto entre vivos y muertos se asocia con la práctica de la disección, lo que muchas veces resulta en la acentuación de las emociones anteriormente relatadas. De todo ello se concluye que la historia de la enseñanza de la Anatomía Humana ha sido interesantemente retratada en el cine desde diferentes puntos de vista.

PALABRAS CLAVE: Educación Médica; Anatomía macroscópica; Cuerpo; Cadáver; Películas.

REFERENCES

Aversi-Ferreira, T. A.; Nascimento, G. N. L. D.; Vera, I. & Lucchese, R. The practice of dissection as teaching methodology in anatomy applied to medical education. *Int. J. Morphol.*, 28(1):265-72, 2010.
Barros Filho, A. A. Burke and Hare, ladrões de corpos do século XIX. *Bol. FCM*, 11(3):16-7, 2016. Available from: https://www.fcm.unicamp.br/fcm/sites/default/files/images/user2/_historia_burke_e_hare.pdf
Bezerra, J. *História do Cinema*. Web Site. Toda Matéria, 2023. Available from: <https://www.todamateria.com.br/historia-do-cinema/>
Caldwell, T. *Film Analysis Handbook: Essential Guide to Understanding, Analysing and Writing on Film*. Cheltenham, Insight Publications, 2011.
Carter III, H. A. *First Cut: A Season in the Human Anatomy Lab*. New York, Picador USA, 1997.
Comer, A. R. The evolving ethics of anatomy: Dissecting an unethical past in order to prepare for a future of ethical anatomical practice. *Anat. Rec. (Hoboken)*, 305(4):818-26, 2022.
Covaleski, R. *Cinema, Publicidade, Interfaces*. Curitiba, Maxi Editora, 2009.
Cunha, M. B. & Giordan, M. A imagem da ciência no cinema. *Quim. Nova Esc.*, 31(1):9-17, 2009.

- Elizondo-Omaña, R. E.; Guzmán-López, S. & García-Rodríguez, M. L. Dissection as a teaching tool: past, present, and future. *Anat. Rec. B New Anat.*, 285(1):11-5, 2005.
- Engelmann, L. Anatomy teaching, dissection, and dignity of the dead. *Lancet*, 400(10359):1188-9, 2022.
- Foltyn, J. L. Dead famous and dead sexy: Popular culture, forensics, and the rise of the corpse. *Mortality*, 13(2):153-73, 2008.
- Jahn, M. A Guide to Narratological Film Analysis. Poems, Plays and Prose: A Guide to the Theory of Literary Genres, 2021.
- Parker, L. M. Anatomical dissection: why are we cutting it out? Dissection in undergraduate teaching. *Anz. J. Surg.*, 72(12):910-2, 2002.
- Passeti, E. A criança, o cadáver e a revolta. *Ecopolítica*, (13), 2015.
- Penafria, M. *Análise de Filmes-conceitos e metodologia(s)*. VI Congresso Sopcom, 6:1-11, 2009.
- Romero-Reverón, R. Human anatomical dissection in the generation Z's medical syllabus. *Anat. J. Afr.*, 11(1):2029-32, 2022.
- Sánchez-Biosca, V. The corpse and the body in Hollywood classical cinema. The Body Snatcher (Val Lewton/Robert Wise, 1945). *Arch. Filmot.*, (14):264-77, 1993.
- Shelley, M. W. *Frankenstein, or The Modern Prometheus*. Oxford, Oxford University Press, 1818.
- Standring, S. *Gray's Anatomy: The Anatomical Basis of Clinical Practice*. 41st ed. Amsterdam, Elsevier, 2015.
- University of Cologne, 2021. Available from: www.uni-koeln.de/~ame02/pppf.pdf
- Vasconcelos, B. C. E. O cegamento na pesquisa científica. *Rev. Cir. Traumatol. Buco-maxilo-fac.*, 16(1):5, 2016
- Warner, J. W. & Edmonson, J. M. *Dissection: Photographs of a Rite of Passage in American Medicine, 1880-1930*. New York, Blast Books, 2009.
- Zwart, H. *A new lease on life: A Lacanian analysis of cognitive enhancement cinema*. In: Hauskeller, M.; Philbeck, T. & Carbonell, C. (Eds.). *Handbook Posthumanism in Film and Television*, Chapter 22. London, Palgrave Macmillan, 2015. pp.214-24.

Corresponding author:

Profa. Catia Helena A. L. Massari, Ph.D.
Faculdade de Medicina Veterinária e Zootecnia
Departamento de Cirurgia
Anatomia dos Animais Domésticos e Silvestres
Universidade de São Paulo
BRASIL

E-mail: catia.massari@alumni.usp.br