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Title

Evolutionary Insights: Glioblastoma Multiforme Across the Tree of Life

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Evolutionary Insights: Glioblastoma Multiforme Across the Tree of Life

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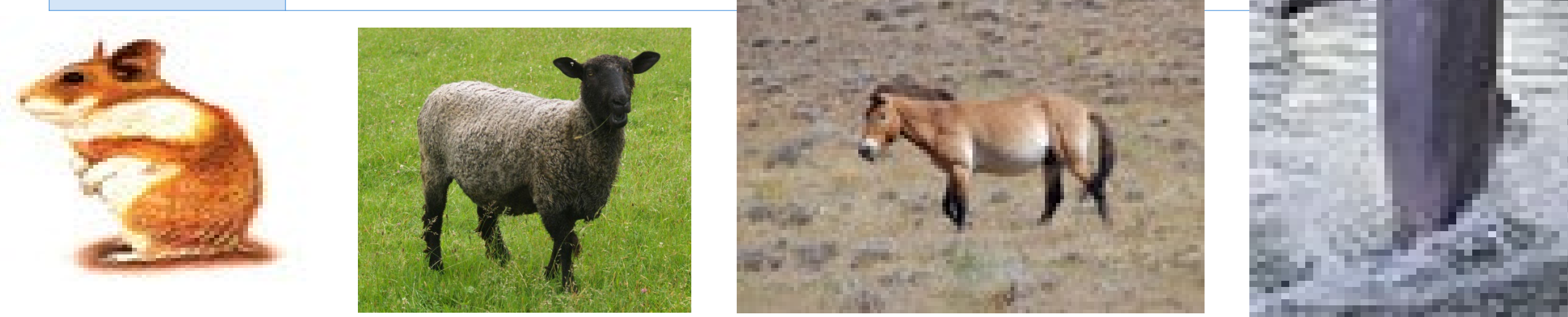


Introduction

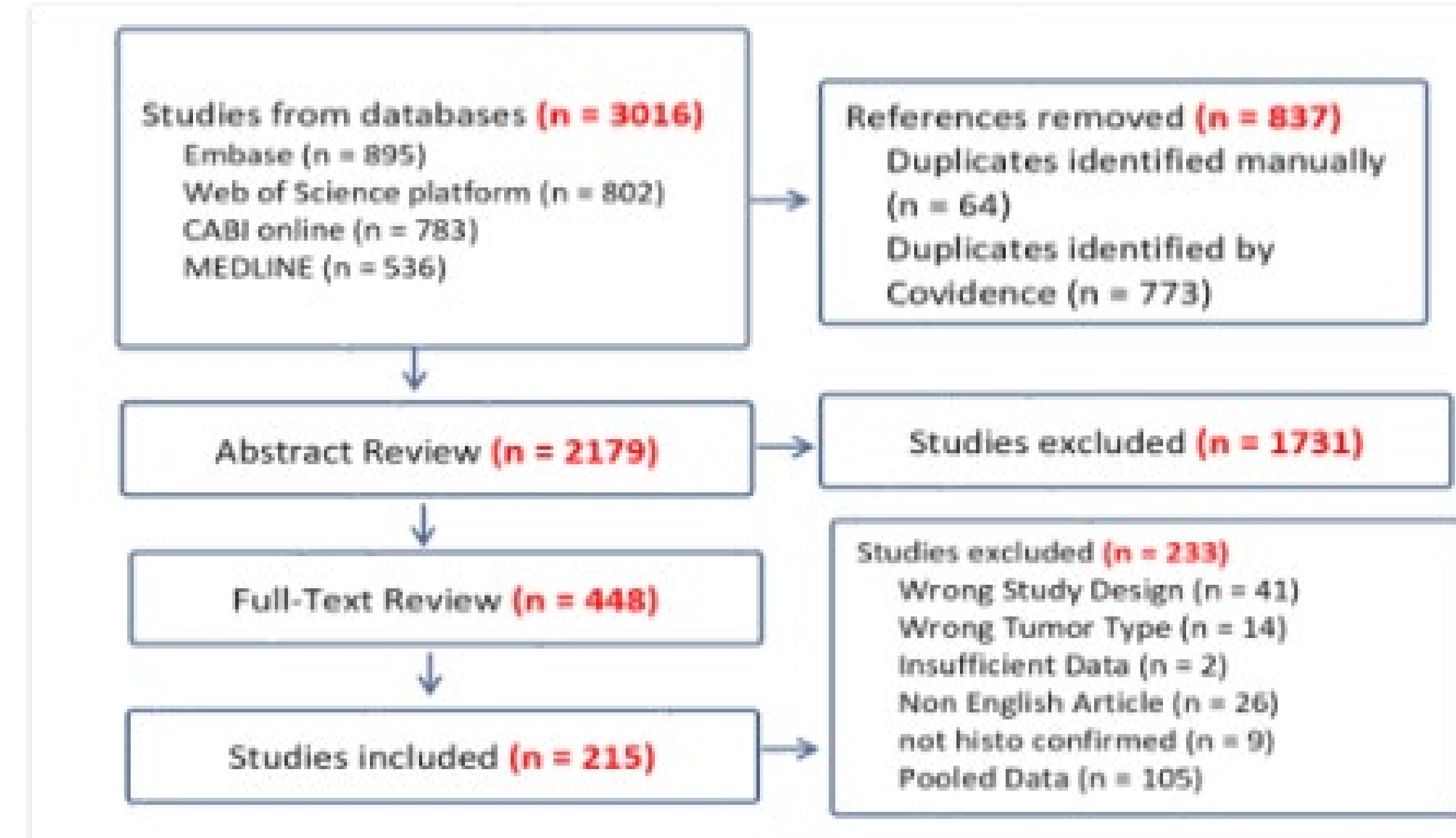
Evolutionary medicine has gained traction in recent years, providing a novel framework for the understanding of human disease. Many diseases, such as cataracts and cardiomyopathy, have been identified, defined, and categorized in multiple species, bringing fresh insights to strategies for understanding and management.

- Glioblastoma Multiforme (GBM, Grade IV Astrocytoma), is the most common, aggressive, and deadly primary brain tumor in adults, with a 5-year survival rate of approximately 5%.²
- Despite avid research, GBM is not well understood.
- Clues toward etiology, risks, prevention, and treatment may be revealed in studying features of this malignancy in other species.

PICO	Inclusion Criteria	Exclusion Criteria
P	Animals	Humans
I	• Spontaneous Histologically Confirmed Glioma	• Artificially induced Glioma
C	• Case Reports • Case Series • Clinical Trials	• Reviews • Meta-Analysis • Abstracts • Conference Presentations
O	• Phylogenetic tree • Tumor behavior • Tumor location • Common markers • Biological profile of tumor.	NA

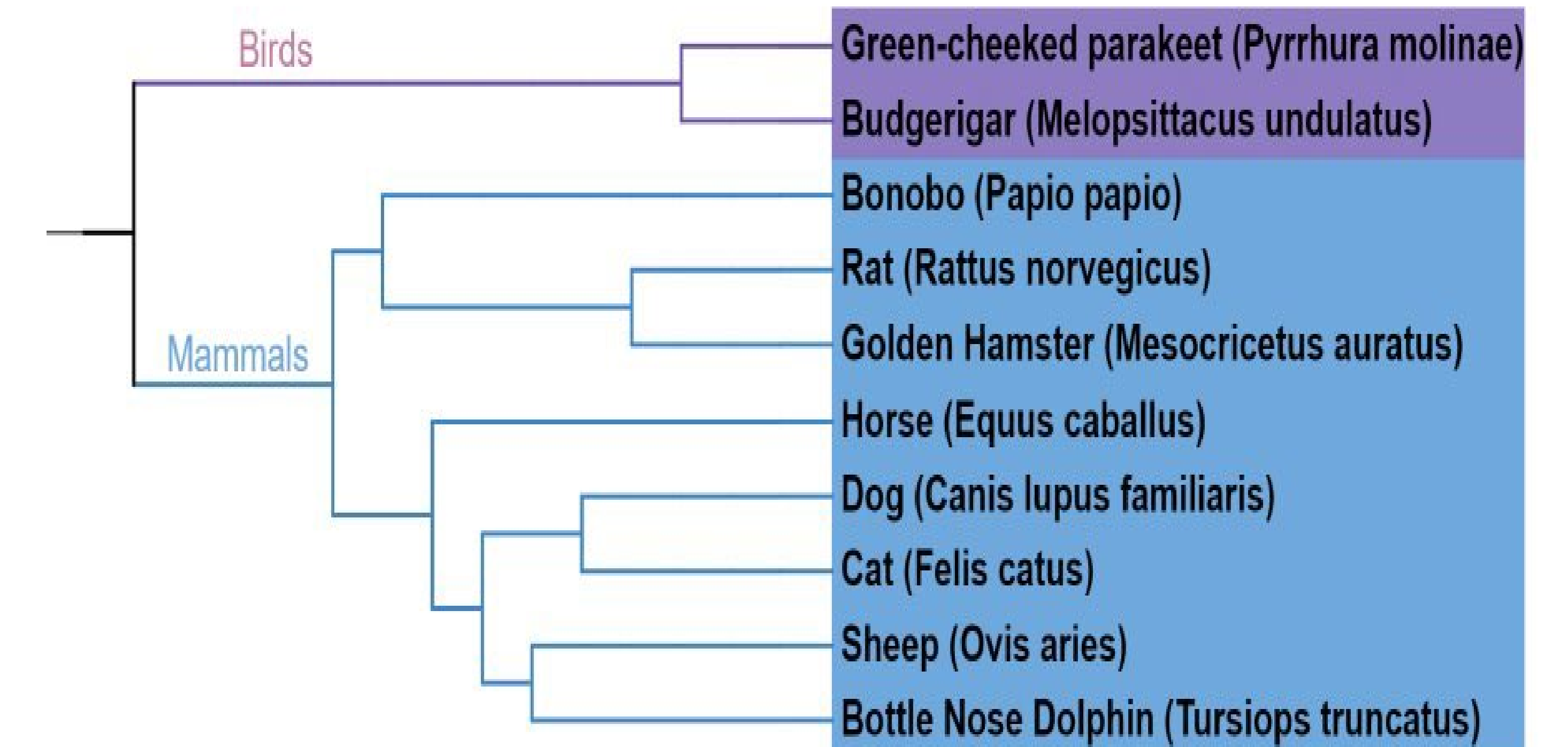


Methods and Materials



Results

Species	Common Name	Sex	Age	Age: Lifespan Ratio	Average weight	Tumor Location	Histopathological Markers
Papio Papio	Baboon	M	12	.33	44 lbs	Left Anterior Cerebrum	GFAP, Ki-67, Vimentin, S-100,
Canis Lupus Familiaris	Dog (Boxer)	M	9	.75	60 lbs	Left Cerebrum	NA
Rattus Norvegicus	Rat	F	1.22	.61	14 oz	Cerebellum	NA
Sus scrofa domesticus	Pig (Yorkshire)	F	.5	.05	200 lbs	Ventral Cerebral Cortex	NA
Felis Catus	Cat (Mongrel)	F	7	.5	10 lbs	Right Frontal Lobe; Olfactory Bulb	GFAP, S-100
Equus Caballus	Horse (Dutch-Warm Blood)	M	4	.13	700 lbs	Piriform and Temporal Lobe	Factor VIII
Daubentonia madagascariensis	Aye-Aye	F	25	.77	6 lbs	Right Frontal Lob	GFAP, Ki-97, ATRX
Tursiops Truncatus	Atlantic Spotted Dolphin	M	"Adult"	NA	400 lbs	Thalamus and Periventricular Region	GFAP,
Melopsittacus Undulatus	Budgerigar	M	3	.14	1 oz	Diencephalon and Mesencephalon	NA
Mesocricetus Auratus	Syrian Hamster	M	.5	.13	3 oz	Left Cerebrum	GFAP,
Ovis Aries	Sheep (Sardinian Ewe)	F	6	.5	200 lbs	Left Cerebrum	GFAP, VEGF, Vimentin, Nestin



Discussion/Conclusion

Peto Paradox

- Larger animals have more tumor checkpoints thus decreased cancer risk.
- In this study, GBM in larger animals appears remarkably less common overall.

Age of Animals

- GBM tends to appear 1st quarter or 4th quarter of an animal's lifespan

Etiology

- Viral etiology unlikely
- Less likely to be environmental

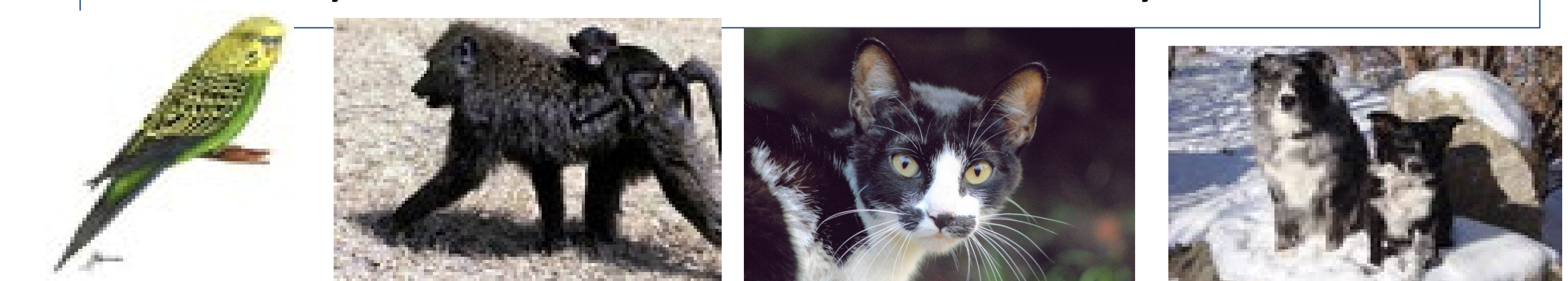
Animal Lineages

- Limited to bird and mammalian lineages
- No cases in reptiles, fish or amphibians

Limitations and Bias

- Paucity of wild samples.
- Overabundance of cat and dog data.

GBM classification varied within human and veterinary medicine; translation necessary.



Contact

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References

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2. Ostrom QT, Gittleman H, Liao P, et al. CBTRUS statistical report: primary brain and central nervous system tumors diagnosed in the United States in 2007-2011. *Neuro Oncol.* 2014;16 Suppl 4(Suppl 4):iv1-iv63. doi:10.1093/neuonc/nou223