

出國報告 (出國類別：研討會)

赴緬甸仰光參加第 8 屆亞洲地區野生 動物保育醫學研討會

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摘要

104 年 10 月 15 日至 19 日赴緬甸仰光參加「第 8 屆亞洲地區野生動物保育醫學研討會」，研討會是由亞洲地區從事野生動物疾病相關工作者分享其研究心得與成果，內容涵蓋野生動物疾病診斷、人畜共患病控制與保育醫學等，又與會者藉由本次研討會相互分享其研究知識、經驗與新的發現等交流。亞洲動物園野生動物醫學及保育學會（Asian Society of Zoo and Wildlife Medicine）創立於 2005 年泰國，這幾年持續在亞洲各個國家輪流舉辦例行學會或研討會。於去年在越南的大會，本學會改名成亞洲保育醫學學會（Asian Society of Conservation Medicine）。今年於緬甸獸醫大學、仰光動物園及自然科學博物館（Natural History Museum in Yangon Zoological Garden）分別舉辦演講及研討會，本屆共有約 130 人參加，來自 19 個不同國家。研討會上發表我國鼬獾狂犬病研究成果包括「臺灣狂犬病病毒分子流行病學分析」及「臺灣鼬獾狂犬病病理學研究」，另外，也發表野生動物監測的成果「臺灣白鼻心犬瘟熱病毒感染之病例報告」，分享台灣經驗，期能建立亞太各國狂犬病區域聯防技術平台，進而協助實現世界衛生組織“2020 年消除狂犬病”的目標。

內容

壹、目的.....	4
貳、研習課程表.....	5
參、研習內容與心得.....	6
肆、檢討與建議.....	17
伍、附件.....	19

壹、目的

很多人類傳染病都源自於動物，如愛滋病（源自黑猩猩）、A 型流行性感冒（源自野鳥）、嚴重急性呼吸道症候群（源自蝙蝠）、登革熱（源自非人類靈長類）與伊波拉出血熱（源自蝙蝠），近年來因氣候變遷使得新興人畜共患病日益增加，分析人類傳染病的文獻，約 60% 為人畜共患病，且 75% 為新興傳染病（Taylor 等人，2001）。在 One World, One Health 的理念下，人類、動物及環境的健康是密不可分，因此，建立生態健全的環境體系，並瞭解疾病與生態系統的交互作用，才能促進人類、動物與環境的健康。每年舉辦之「亞洲地區野生動物保育醫學研討會」今年為第八屆，本研討會是由亞洲地區從事野生動物疾病相關工作者分享其研究心得與成果，內容涵蓋野生動物疾病診斷、人畜共患病控制與保育醫學等，經由與會人員的分享研究知識、經驗與新的發現等交流，並藉此平台使亞洲各國在此專業及學術領域的專家能有更多的交流及合作機會。台灣自 103 年 7 月確診狂犬病後，送至本所野生食肉目動物約 2,500 例，野生動物疾病中有許多病原具有傳染人類之風險，由於本所業務主要著重在家畜、禽等經濟動物疾病診斷，而對野生動物疾病診斷的經驗仍嫌不足，因此，藉由參加此研討會，除可瞭解亞太地區野生動物疾病現況，亦可學習野生動物疾病診斷經驗。

貳、研習課程表

日期	行程	地點
10月15日	<ol style="list-style-type: none"> 1. 台灣桃園國際機場第一航站出發至緬甸仰光機場。 2. 亞洲地區之動物園及野生動物保育醫學重要性 課程： <ul style="list-style-type: none"> • Introduction of Wildlife Medicine (Dr. Toshio Tsubota, Hokkaido University, Japan) • Introduction of Zoo Medicine (Dr. Paolo Martelli, Ocean Park Corporation, Hong Kong) • Application of wildlife medicine for the human society (Dr. Toshio Mizoguchi, Fukushima Wildlife Rehabilitation Center, Japan) • General Concept for Conservation Medicine (Dr. Pam Whiteley, The University of Melbourne, Australia) • Conservation of Wildlife in Myanmar (Dr. Khyne U Mar, ASCM Advisor, Myanmar) • One Health Education in Asia (Prof. Dr. Junpei Kimura, ASCM Secretary General) 	緬甸獸醫大學 University of Veterinary Science (UVS), Yezin, Naypidaw
10月17~18日	<ol style="list-style-type: none"> 1. 亞洲地區野生動物保育醫學研討會，包括野生動物疾病診斷、人畜共患病控制與保育醫學等。 2. 口頭及壁報學術發表。 	歷史自然博物館 Natural History Museum in Yangon Zoological Garden
10月19日	歸赴 (仰光-台北)	

參、研習內容與心得

本次赴緬甸仰光之行程於民國 104 年 10 月 15 日上午由桃園國際機場搭機出發，於仰光參加第八屆「亞洲地區野生動物保育醫學研討會」，為期 4 天時間，於 10 月 19 日搭機返台。

亞洲動物園野生動物醫學及保育學會 (Asian Society of Zoo and Wildlife Medicine) 創立於 2005 年泰國，這幾年持續在亞洲各個國家輪流舉辦例行學會或研討會。於去年在越南的大會，本學會改名成亞洲保育醫學學會 (Asian Society of Conservation Medicine)。今年於緬甸獸醫大學、仰光動物園及自然科學博物館 (Natural History Museum in Yangon Zoological Garden) 分別舉辦演講及研討會。詳細研習內容與心得依序條列如下：

一、10 月 15 日

10 月 15 日自桃園中正國際機場搭機飛往緬甸 (Myanmar) 仰光 (Yangon International Airport) 國際機場，參加亞洲地區之動物園及野生動物保育醫學重要性課程。亞洲對動物園醫學及野生動物醫學的教育並沒有比歐美國家完善，而其重要性卻是無庸置疑的，因此每年的亞洲地區野生動物保育醫學研討會的會前都會邀請國際上這方面的專家進行專題演講，主題為動物園及野生動物保育醫學，對象為獸醫系學生、緬甸動物員獸醫師及工作人員。10 月 15 日行程於緬甸獸

醫大學內舉辦專題演講：

(一) 野生動物保育醫學介紹 (Introduction of Wildlife Medicine)

由日本北海道大學的 Dr. Toshio Tsubota 主講，Dr. Tsubota 主要研究大型哺乳類，如熊、鹿、海豹及浣熊的行為學、繁殖障礙與傳染病等。另外，Dr. Toshio Tsubota 也有參與尼泊爾大象結核病及萊姆病的研究。Dr. Toshio Tsubota 從他豐富研究經驗為大家介紹野生動物保育醫學及管理，以保護生物的多樣性。

(二) 海洋哺乳類保育介紹

由香港海洋公園的 Dr. Paolo Martelli 主講，Dr. Martelli 為一位具豐富臨床經驗的獸醫師，Dr. Martelli 分享首次為雀鳥做白內障手術，成功為一隻 20 歲的托哥巨嘴鳥恢復視力。

(三) Application of wildlife medicine for the human society (Dr. Toshio Mizoguchi, Fukushima Wildlife Rehabilitation Center, Japan)

Dr. Mizoguchi 介紹野生動物對人類社會的重要性，生命形態包括人類、動物、植物及微生物，彼此間是互相依賴密不可分，這些生命的形態連同環境構成生態系統，其中野生動物在這些系統內具有內在價值，且關連到人類健康和福祉。因野生動物的健康與否是悠關到生態系統的平衡，而獸醫的專業知識可以提供解決野生動物品種正加速性的滅絕、人畜共患病的案件增加等問題。

(四) General Concept for Conservation Medicine (Dr. Pam Whiteley, The University of Melbourne, Australia)

Dr. Whiteley 致力於野生動物的保育醫學，因為野生動物的健康與生物多樣性、環境健康、人類健康、家畜健康等息息相關。在環境不斷變化之下，疾病對人類與動物的影響也將改變，甚而有更多無法預期的疾病發生。保育醫學這門科學包括了人類、動物及生態健康等領域，這些領域又常與其他環境因子如生物多樣性、氣候變遷、環境破壞、疾病傳播等互相影響。這個世界是一個共同的生命體，人、動物與環境的健康實為密不可分的整體，現今逐漸浮現的「人畜共患病」議題，亞太地區都應該關注、共同面對、解決的問題，以達到 one health 的終極目標。

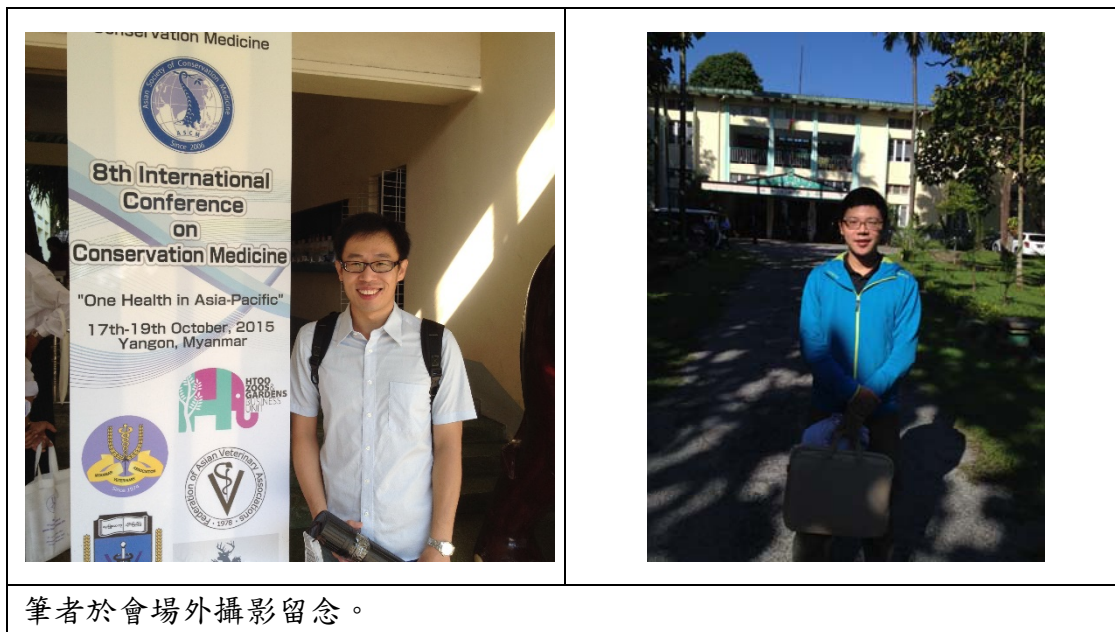
二、10月17~18日

此兩天為本次研討會的重頭戲「亞洲地區野生動物保育醫學研討會」，今年為第八屆，於仰光動物園及自然科學博物館舉行，本次共有約130人參加，包括台灣、日本、泰國、韓國、緬甸、馬來西亞、美國、印度尼西亞、新加坡、斯里蘭卡、越南、柬埔寨、尼泊爾、澳洲、孟加拉國、法國、印度、香港及英國等19個國家。

研討會是由從事野生動物疾病相關工作者分享其研究心得與成果，本次共51位進行口頭論文報告與36位張貼論文壁報。目的為野

生動物保育及獸醫學領域的資訊交換平台，並藉此平台孕育亞洲各國在此專業及學術領域的專家能有更多的交流及合作機會。

本次會議討論的議題包括「與世界野生動物疾病學會合辦的分支桿菌會議(結核分枝桿菌及非結核分枝桿菌)」，「野生動物醫學及保育醫學聯絡網」，「環境與疾病醫學」，「海洋哺乳類醫學」，「基礎醫學」，「大象保育醫學」，「臨床醫學」，「病理及寄生蟲醫學」；而「在亞洲建立野生動物疾病監測合作計畫以及與世界野生動物醫學與疾病學會合作」的工作進度及未來發展，也是本次會議的重點。



(一) 結核分枝桿菌及非結核分枝桿菌 (Mycobacterium –ASCM-WDA Joint Session)

分枝桿菌屬普遍存在我們生活的周遭環境中，如土壤、水、及某些動植物身上等，分支桿菌是相當重要的人畜共通傳染病，

人類被感染都發生在免疫功能不全的病患上，但某些無明顯免疫功能異常的健康人也可能被感染。分枝桿菌屬包括結核分枝桿菌群（*Mycobacterium tuberculosis complex*; MTC）與非結核分枝桿菌（*Nontuberculosis mycobacterium*; NTM），NTM 又稱環境結核菌，約 130 種，指除了 MTC 以外的分枝桿菌通稱為非結核分枝桿菌，MTC 包括結核分枝桿菌（*Mycobacterium tuberculosis*）、牛型分枝桿菌（*M. bovis*）、非洲分枝桿菌（*M. africanum*）、田鼠分枝桿菌（*M. microti*）、癩瘋分枝桿菌（*M. leprae*）及卡式分枝桿菌（*M. canetti*）。近年來保育醫學致力於分枝桿菌的防範與控制，如何有系統性地在動物及環境上監測將是 One Health 研究的重要指標。茲列出具重要性之研究：

1. Dr. Pam Whiteley 在紐西蘭野生動物分枝桿菌的控制策略上提出她的多年來有效降低場盛行率<0.2%的方法：
牛及鹿等結核菌素監測及屠宰場屠體監測、移動管制陽性場、在污染場降低野生動物分枝桿菌帶菌者（vector）負鼠（possum）的密度族群。



2. Dr. Suttipong Suttiyaporn 報告圈飼大象感染人型分枝桿菌 (*M. tuberculosis*)，臨床上僅出現沈鬱及側躺，治療後症狀恢復，但 2 個月後無預警死亡，剖檢肺臟可見多發結節，經確診後證實感染人型分枝桿菌，而園內其他大象並無檢測出其他陽性病例，相關飼養員及獸醫師亦為陰性，因此本病例為偶發案例。後續該園啟動對象群及人員的分枝桿菌監測，另加強人員的知識，以降低結核分枝桿菌傳播風險。

3. 台灣大學獸醫所的李文達醫師及郭軒醫師分別報告台北動物園香港疣螈海洋分支桿菌感染症和台大動物醫院救傷海龜的分支桿菌和旋畢科吸蟲混合感染病例報告，兩者皆引起與會學者高度的興趣。在香港疣螈的病例中，其所造成的病變和一般分支桿菌所造成的肉芽腫

病變不同，目前推測可能和緊迫導致的免疫抑制以及 Mycolactone 這個物質有關。

(二) 野生動物醫學及保育醫學聯絡網

亞洲動物園野生動物醫學及保育學會 2005 年於泰國創立，這幾年持續在亞洲各個國家輪流舉辦例行學會或研討會。學會希望亞洲各國動物園獸醫師能有連絡的網絡，來讓這些臨床獸醫師有交流及聯繫的平台，並藉此平台孕育亞洲各國在此專業及學術領域的專家能有更多的交流及合作機會，以達成“*One health in Asia Pacific*”目標。

(三) 環境與疾病醫學

環境與疾病醫學主題包括屏東科技大學陳貞志助理教授報告以台灣鼬獾狂犬病為例如何評估野生動物族群密度，陳博士比較 absolute population abundance (AA) 及 photographic rate (photographs per sampling time; PR) 兩種估算方式，其發現 PR 與 AA 並沒有相關，因此以 PR 來評估族群密度必須很謹慎。Dr. Deborah McCauley 報告從狗溢出的犬瘟熱病毒 (CDV) 威脅尼泊爾境內的野生食肉目動物，此情況與台灣相似，目前本所蒐集到白鼻心感染 CDV 病例，其病毒也是來自犬的 CDV。筆者以壁報方式發表「臺灣白鼻心犬瘟熱病毒感染之病例報告」，

臺灣自發生鼬獾狂犬病後，送至本所野生食肉目除狂犬病監測外，另有進行犬瘟熱病毒檢測，至今，於 291 例鼬獾中檢測 1 例有犬瘟熱病毒，77 例白鼻心有 7 例，罹病白鼻心有出現神經症狀，剖檢無明顯肉眼病變，病理可見在腦及脊髓呈非化膿性脫髓鞘性腦脊髓炎，嗜酸性細胞核內及質內包涵體出現於神經元、星狀細胞及多核巨大細胞，經免疫組織化學染色可在那些細胞見到病毒抗原。



(四) 海洋哺乳類醫學

此主題與基礎醫學同時進形，筆者詢問參加此主題的台灣大學獸醫所李文達醫師，李醫師發表了鯨豚 *Crassicauda* spp. infestation 的回溯性調查，利用骨骼標本當作樣本來研究疾病對於鯨豚的健康影響。會議後有一個小組討論，主要是和當地官員討論緬甸當地鯨豚保育的困境。在討論之中可以發現，相較於台灣已經建立完整的擱淺鯨豚處理組織網，其他國家，不管

是韓國、日本或緬甸在這個部分仍有許多進步的空間。

(五) 基礎醫學

基礎醫學主題包括：Dr. Jiranan Insee 發表利用分子技術成功解碼東方赤頸鶴(Eastern Sarus Crane)性染色體的核酸序列，以因應泰國境內東方赤頸鶴正面臨即將滅絕的困境，此技術可使保種計畫有所突破。Dr. Sirinart Chaichanathong 發表以 real-time RT-PCR 技術成功定量鹿的 IFN- γ 表現，IFN- γ 為參與細胞內病原重要免疫反應，尤其是細胞媒介性免疫反應，本技術可應用於偵測分枝桿菌感染及 BCG 疫苗使用的監測。

(六) 大象保育醫學及臨床醫學

由於第二天上午會議的主軸是大象議題，又逢仰光動物園大象莫莫 62 歲的生日，因此主辦單位在會議空檔的休息時間，安排所有與會的專家與醫師，參加了仰光動物園大象莫莫 62 歲的生日會，大象莫莫 7 歲時從緬甸東部克耶邦移居仰光動物園，是該動物園裡最受歡迎的動物之一，而大會也利用這個慶生會倡導大象疾病及保育的議題。而會議上，泰國、緬甸及斯里蘭卡等國家發表許多對大象疾病的研究、診斷及治療等報告，他們對大象的處理的確是經驗豐富，發表內容讓我們對這些創新的象疾病處理方式感到驚艷。



(七) 病理及寄生蟲醫學

筆者在此議題發表了「臺灣鼬獾狂犬病的分子流行病學和病理學研究」。臺灣已超過 50 年沒有狂犬病病例報告，但在 2013 年的野生動物疾病監測中發現鼬獾存在狂犬病病毒，而鼬獾狂犬病經基因序列分析結果顯示，臺灣鼬獾病毒株為獨立於亞洲狂犬病病毒群，利用分子時鐘推估病毒演化分歧點，臺灣鼬獾病毒株已存在 91 至 113 年。罹病鼬獾可見無至中等程度的非化膿性腦膜腦脊髓炎，病變包括淋巴球性漿胞性腦膜炎及圍管、神經元變性、細胞質內 Negri body 等，而病毒的抗原量則以腦幹最多。

此外也以論文壁報方式發表「2013-2015 年臺灣狂犬病病毒分子流行病學分析」，我國 50 多年來首次發現之本土狂犬病病例，為瞭解臺灣狂犬病流行情形，動物防疫機關展開大規模食肉目野生動物流行病學調查。自 2013 年 7 月 1 日至 2015 年 7

月 31 日為止，共計檢測 5,245 例動物病例，其中 487 例 (鼬獾 480 例、白鼻心 5 例、鮑鼈 1 例及犬 1 例) 確診為狂犬病，狂犬病陽性率分別為：鼬獾 39.74% (480/1,208)、白鼻心 1.72% (5/290)、鮑鼈 0.57% (1/174)及犬 0.03% (1/2,915)。其他物種包括蝙蝠皆為陰性，鼬獾仍為臺灣狂犬病主要之發病動物。依狂犬病病毒核蛋白核酸序列分析結果顯示，臺灣鼬獾病毒株可明顯區分為兩群：(1)中部-南部分群(TW-CS)：包括南投縣、臺中市、雲林縣、嘉義縣、臺南市及高雄市等 6 縣市；(2)東部分群(TW-E)：花蓮縣、臺東縣及屏東縣等 3 縣市。TW-CS 及 TW-E 分群彼此間核蛋白基因序列相似性僅 91.4-93.5%，結果顯示我國鼬獾狂犬病病毒已形成二獨立演化分支。臺灣原本是少數 OIE 認定的狂犬病非疫區國家，但突然宣佈為疫區，又加上這段時間內並無人或動物發生狂犬病案例，因此兩主題皆引起與會學者高度的興趣，且希望我們多分享在這方面的經驗。

	
<p>筆者發表「2013-2015 年臺灣狂犬病病毒分子流行病學分析」，與 Dr. Pam Whiteley 分享成果。</p>	<p>筆者與優秀學生合影，本次論文發表遴選 8 位最佳報告人員，台大學生就囊括了 4 個名額。</p>

肆、檢討與建議

本出國計畫目的為藉由參加此研討會，除可瞭解亞太地區野生動物疾病現況，亦可學習野生動物疾病診斷經驗。野生動物疾病中有許多病原具有傳染人類之風險，由於本所業務主要著重在家畜、禽等經濟動物疾病診斷，而對野生動物疾病診斷的經驗仍嫌不足，就參與研討會期間觀察，歸納出以下檢討與建議提供參考：

一、野生動物疾病診斷之重要性：

自 103 年 7 月確診狂犬病後，送至本所野生食肉目動物約 2,500 例，野生動物疾病中有許多病原具有傳染人類之風險，且約 75% 為新興傳染病。由於本所業務主要著重在家畜、禽等經濟動物疾病診斷，而對野生動物疾病診斷的經驗仍嫌不足，因此，藉由參加此研討會，除可瞭解亞太地區野生動物疾病現況，亦可學習野生動物疾病診斷經驗。

二、瞭解亞太地區野生動物疾病疫情及研究現況：

與會人員不乏亞太地區野生動物診斷及研究專家、學者或獸醫師等，參與此次會議有助分享臺灣狂犬病經驗並促進交流，另外瞭解亞太地區野生動物狂犬病現況，強化我國對亞太地區狂犬病防治國際觀，並期能建立亞太各國狂犬病區域聯防技術平台，進而協助實現世界衛生組織“2020 年消除狂犬病”的目標。

三、建立亞太各國狂犬病區域聯防技術平台：

亞太地區除日本外都有狂犬病疫情，尤以中國及印度疫情較為嚴重，狂犬病的疫情是無法以國界分割，需要各國的努力，才能實現世界衛生組織“2020 年消除狂犬病”的目標，因此如何發展自己的特色，同時在某些議題需要國際分工並共享研究成果，

此國際交流及合作的持續，是一個重要的工作。

四、 加強獸醫技術輔導與推廣：

本組肩負動物疾病診斷及執行狂犬病監測計畫之責，藉由參加國際會議，把握學術交流機會，除可瞭解亞太地區野生動物狂犬病疫情及研究現況，並有助於加強與推廣臺灣目前執行狂犬病監測及診斷業務，使狂犬病診斷實驗室能力與國際接軌。

五、 增加本所研究人員之學術交流：

積極參與此類國際會議，除增加本所研究人員的自信外，亦可激發更積極的研究動能，並從其中開展其國際觀及研究視野。另外，增加研究人員與世界各國專家的交流機會，在疾病診斷及研究的道路上，可以相互協助與合作，甚至我們的研究資源及能量是有能力協助亞太其他國家。

伍、附件

第 8 屆亞洲地區野生動物保育醫學研討會大會手冊，共 72 頁。

ONE HEALTH IN ASIA PACIFIC



8th Asian Society of Conservation Medicine Meeting, Myanmar 2015

*University of Veterinary Science,
Yezin, Yangon*

*Zoological Garden, Yangon
October, 15-19, 2015*



8TH ASIAN SOCIETY OF CONSERVATION MEDICINE (ASCM) MEETING MYANMAR 2015



**University of Veterinary Science, Yezin
Yangon Zoological Garden, Yangon**

ONE HEALTH IN ASIA PACIFIC

Committees

*8th International Conference of ASCM in Myanmar
15 – 19th October, 2015*

Hosted by:

- Asian Society of Conservation Medicine (ASCM)
- Myanmar Veterinary Association (MVA)
- University of Veterinary Science (UVS)
- Yangon Zoological Gardens, Htoo Group of Companies
- Asian College of Conservation Medicine (ACCM)

Supported by:

- Japanese Society of Zoo and Wildlife Medicine
- Korean Society of Zoo and Wildlife Medicine
- Gifu University, Japan
- Seoul National University (SNU), Korea
- Federation of Asian Veterinary Association (FAVA)
- Taipei Zoo, Taiwan
- Asian Association of Veterinary Schools (AAVS)

Local committee members:

- Dr. Saw Plei Saw (Chief Advisor)
- Prof. Dr. Tin Tin Myaing (President, Myanmar Veterinary Association)
- Prof. Dr. Ye Htut Aung (Pro Rector, Academic Affairs, University of Veterinary Science)
- Dr. Soe Minn(Secretary, Myanmar Veterinary Association)
- Dr. Khyne U Mar (Advisor of ASCM)
- Mr. Saw Eh Mular (Yangon Zoological Gardens, Htoo Group of Companies)
- Dr. Tun Myint (Yangon Zoological Gardens, Htoo Group of Companies)
- Dr. Khin Maung Win (Board of ASCM)
- Dr. Tint Lwin (Wildlife Conservation Society)
- Mr. Wynn Than (Local Advisor of ASCM)

ASCM committee members:

- Prof. Tokuma Yanai (Senior Board, Gifu University, Japan)
- Prof. Junpei Kimura (Secretary General, Seoul National University, Korea)
- Prof. Ki-Jeong Na (Chungbuk National University, Korea)
- Dr. Alice Lau (Universiti Putra Malaysia, Malaysia and Seoul National University, Korea)



Dear distinguished guests and colleagues,

On behalf of Myanmar Veterinary Association and Asian Society of Conservation Medicine, it is my great pleasure to welcome you to participate the 8th International conference on Conservation Medicine, held in Yangon, Myanmar.

This event offered the opportunity to gain new findings and experiences in numerous interesting topics, focus on “One health in Asia” that including zoo and wildlife medicine, wildlife management, ecosystem preservation and zoonosis control.

By joining the conference to discuss issues of mutual concerns and solutions, hope to obtain excellent knowledge on wild life conservation medicine.

Thanks to all people who have contributed to the success of the conference and the authors of the papers that are making up this publication.

Special thanks to the Asian Society of Conservation Medicine, Myanmar Veterinary Association, Federation of Asian Veterinary Association, University of Veterinary Science and Htoo Zoo and Gardens staff to become a successful event leading to One Health in Asia.

I look forward to welcoming all veterinarians, practitioners and valuable guests to Yangon, Myanmar to enjoy our warm conference.

Professor Dr. Tin Tin Myaing
President
Myanmar Veterinary Association

First Meeting as Asian Society of Conservation Medicine (ASCM)

Tokuma Yanai and Junpei Kimura
Senior board and Secretary General of ASCM

2015 is the year of us marking the 10th year of the establishment of our society, after we first had our meeting at Kasetsart University in 2005. From formerly being known as Asian Society Zoo and Wildlife Medicine (ASZWM) to current Asian Society of Conservation Medicine (ASCM) which has been officially announced during last year annual meeting in Vietnam, we no longer focus merely on the establishment of the zoo network, serve not only as information sharing platform, but also together we would like to accentuate on education and more collaborations with other societies, so that our society can grows up into a real one-health society in Asia- pacific.

We had successfully organized the joint session of “Wildlife diseases surveillance in Asia” in our last year annual meeting as the outcome of our collaboration with Wildlife Disease Association (WDA). It was the first collaboration meeting with the main objective to establish wildlife disease surveillance system in Asia which will mutually benefits both societies especially in the exchange of information regarding infectious diseases and more. This year, ASCM-WDA joint session will share with you some valuable information and cases under the topic of Mycobacterium.

After our first challenge of organizing pre-educational workshop with Vietnam National University of Agriculture, with the support from the Federation of Asian Veterinary Association (FAVA), Gifu University and OIE last year, we extended the challenge to University of Veterinary Science (UVS), Nay Pyi Taw, Myanmar conveying the same objectives of educating and bringing up the awareness of local students, scientists and veterinarians toward the importance of conservation medicine through our one-health education.

As for our Asian College Conservation Medicine (ACCM), which is established in year 2012 by our society with the introduction of diploma system and we are proudly to announce that up to the date we have granted over 25 diploma members who formed community that supports and sustains our society.

Another achievement of ours is the setting up of our website system which is the great contributions from our member of committees that are currently still continue to working on perfecting our website system.

We hope that we are showing you that our society is continuously pursuing for chances to improve ourselves in many aspects. We are hoping that with your supports, we can continue to organize pre-educational workshop and the joint session every year.

We appreciate your highly supports as always and as the one and only society that holds the meeting on conservation medicine in Asia, let us work hard together to share out “One health in Asia-pacific” concept in our continents.

Pre-congress Workshop at University of Veterinary Science, Yezin, Nay Pyi Taw, Myanmar

15th October

Welcome Speech:

- Mar Mar Win (Rector, University of Veterinary Science)
- Achariya Sailasuta (Secretary General, Federation of Asian Veterinary Association, FAVA)

Lectures (Tentative):

1. Introduction of Wildlife Medicine
Toshio Tsubota (Hokkaido University, Japan)
2. Introduction of Zoo Medicine
Paolo Martelli (Ocean Park Corporation, Hong Kong)
3. General Concept for Conservation Medicine
Pam Whiteley (University of Melbourne, Australia)
4. Conservation of Wildlife in Myanmar *Page 69*
Khyne U Mar (ASCM Advisor, Myanmar)
5. Educational and research activities performed by Wild Animal Medical Center, Rakuno Gakuen University
Mitsuhiko Asakawa; Rakuno Gakuen University

Closing Speech:

- Junpei Kimura (ASCM Secretary General)

ASCM Annual Meeting at Yangon Zoological Garden, Yangon, Myanmar

17th October

0830-0900 Registration

(Except participants from Korea, Thailand, Japan, Taiwan and Malaysia)

0900-0930 Opening ceremony

Opening remarks:

Tin Tin Myaing (Myanmar Veterinary Association)

Tokuma Yanai (ASCM)

Saw Plei Saw (Myanmar Veterinary Association)

0930-1200 Mycobacterium –ASCM-WDA Joint Session

Page 14-20

Chaired by: Pam Whiteley

0930-1000 Mycobacteriosis in Wildlife in New Zealand: A One Health Issue

Maurice Alley; Massey University

Subsession 1: *M. tuberculosis* Complex

Chaired by: Aung Ye Htut

1000-1015 Tuberculosis in a female African elephant: A Case report

Suttipong Suttiyaporn; Nakorn Ratchasima Zoo

1015-1030 Genetic Feature of *Mycobacterium bovis* isolated from Japanese Sika Deer (*Cervus nippon centralis*) in Zoological Garden in Osaka
Aki Tamaru; Osaka Prefectural Institute of Public Health

1030-1045 Molecular Characterization of *Mycobacterium orygis* Isolates from Animals of South Asia
Thapa Jeewan; Research Center for Zoonosis Control, Hokkaido University

1045-1100 Worldwide Occurrence of Tuberculosis in Elephants, Current Diagnostic Technologies, and Future Research
Susan Mikota; Elephant Care International

Subsession 2: Non-tuberculosis Mycobacterial Species

Chaired by: Wijit Banlunara

1100-1115 Mycobacteriosis Working Group in ASCM: A Challenge to unite Clinical Cases and Bacterial Information towards One Health
Takayuki Wada; Nagasaki University

1115-1130 Evaluation of *Mycobacterium kansasii* as Zoonosis Pathogen by “One Health Infectious Animal Model”
Shiomi Yoshida; NHO Kinki-Chuo Chest Medical Center

1130-1145 Systemic Spirochidiasis and Mycobacteriosis in a Green Sea Turtle (*Chelonia mydas*)
Shanny Hsuan Kuo; National Taiwan University

1145-1200 High Mortality Event of Hong Kong Newt (*Paramesotriton hongkongensis*) in Taipei zoo
Wen-Ta Li; National Taiwan University

1200-1330 Lunch and poster session

1330-1430 Networking Session

Chaired by: Achariya Sailasuta, Chen-Chih Chen

Page 20-22

1330-1345 An Over view on Medical Care for Injured Free-ranging Avian and Mammalian Species performed by the Wild Animal Medical Center of Rakuno Gakuen University between 2003 and 2014
Mitsuhiko Asakawa; Rakuno Gakuen University

1345-1400 ASCM started Collaboration with Global Networks for Wildlife Disease Surveillance
Tokuma Yanai; Gifu University

1400-1415 Networking: The Whooping Crane Health Advisory Team example
Barry K. Hartup; International Crane Foundation

1415-1430 Enhancing One Health: Integrating Toxicological and Infectious Disease Research for a more Holistic Approach
Patricia Bright; U.S. Geological Survey- Environmental Health

1430-1515 Disease Ecology Session*Page 22-24*

Chaired by: Parntep Ratanakorn

1430-1445 Why does Population Density Matter and How to Estimate It? Using Ferret-badger, a Principle Reservoir of Rabies in Taiwan, as an example

Chen-Chih Chen; National Pingtung University of Science and Technology

1445-1500 Canine Distemper Virus in the Buffer Zone of Chitwan National Park, Nepal – Threats to Wild Carnivore Populations

Gretchen Kaufman; Veterinary Initiative for Endangered Wildlife

1500-1515 Zoonotic Simian Malaria in Peninsular Malaysia: Molecular Epidemiology and Spatial Distribution

Reuben Sharma / Reuben Sharma; Universiti Putra Malaysia

1515-1530 Tea break

1530-1700 Marine Mammals Session (ROOM 1)*Page 24-27*

Chaired by: Yuko Tajima, Tadasu Yamada

1530-1545 Introductory talk and General Biology:

Our Understanding on the Sperm Whale (*Physeter macrocephalus*)

Tadasu K. Yamada; National Museum of Nature and Science

1545-1600 How we can monitor their health:

Retrospective Study of Skull Trabecula-like Lesions in Cetaceans around Taiwanese Waters

Wen-Ta Li; National Taiwan University

1600-1615 Persistent Environmental Pollutants in Asian Coastal Waters - Contamination of Dolphin Brains

Mari Ochiai; Ehime University

1615-1630 Overview on Marine Mammals of Myanmar:

Current Status of Marine Mammals in Myanmar.

Tint Tun; Marine Science Association Myanmar (MSAM)

1630-1645 Distribution of Irrawaddy Dolphin in Irrawaddy (Ayeyawady) river, Myanmar

Han Win; Department of Fisheries, Myanmar

1645-1700 General discussion

1530-1630 Basic science Session (ROOM 2)*Page 27-29*

Chaired by: Seong-Chan Yeon and Jae-Ik Han

1530-1545 Seasonal Change in Body Weight of Japanese Pipistrelle (*Pipistrellus abramus*) and Asian Parti-colored Bat (*Vespertilio sinensis*), in relation with Hibernation

Ami Nakajima; Tama Zoological Park

1545-1600 Genetic Diversity of Sex Chromosome in Captive Eastern Sarus Crane (*Grus antigone sharpii*) and Its Application for Sexing and Genetic Management

Jiranan Insee; Rajamangala University of Technology Isan Kalasin Campus

1600-1615 Sequencing Analysis of Interferon gamma (IFN- γ) of Thai Cervidae and Preliminary Quantification of Rusa Deer's IFN- γ mRNA Expression by Real-time Reverse Transcriptase Polymerase Chain Reaction (RT-PCR)
Sirinart Chaichanathong; Kasetsart University

1615-1630 Effect of Capacitation Media on Post-thaw Rusa Deer (*Rusa timorensis*) Spermatozoa
Apichaya Sudsukh; Kasetsart University

1630-1730 Zoo Vet Networking (ROOM 2)

Chaired by Paolo Martelli

18:30- Welcome party

18th October

0930-1215 Elephant Session

Page 30-36

Chaired by: Saw Plei Saw, Jeewan Thapa and Manjula Jayasinghe

0930-1000 The Threats and the Future of Myanmar Elephants
Khyne U Mar; University of Sheffield

1000-1015 The Genetic Structure of Domestic Asian Elephant across Thailand
Worawidh Wajjwalku; Kasetsart University

1015-1030 Seasonal Incidence of Gastrointestinal Nematode Infestation in Myanmar Timber Elephants
Ye Htut Aung; University of Veterinary Science, Yezin, Myanmar

1030-1045 The Coprological Survey of Endoparasites in Captive Asian Elephant in Kanchanaburi Province
Weerapun Nokkaew; Kasetsart University

1045-1100 Emerging Parasitic and Infectious Diseases of Wild Asian Elephants (*Elephas maximus*) in Udawalawe National Park, Sri Lanka
Vijitha Perera; University of Peradeniya

1100-1115 Treatment of Multiple Limb Chronic Lameness in a Geriatric Asian Elephant (*E. maximus*) in a Traditional Setting, a 2 Years Road Map
Paolo Martelli; Ocean Park Hong Kong

1115-1130 The Study of Fecal Cortisol Metabolites between Wild, Trekking and Non-Trekking Elephants in Kanchanaburi Province, Thailand
Nikorn Thongtip; Kasetsart University

1130-1145 Measurement of Cortisol Levels in Pregnant Asian Elephant (*Elephas maximus*)
Patcharapa Towiboon; Chiang Mai University

1145-1200 Characterization of Aerobic Microbial Flora from Wounds and Eye Discharges in a Group of Captive Sri Lankan Elephants (*Elephas maximus maximus*)
W.M.N.K. Jayathilake Jinadasa; University of Peradeniya

1200-1215 Antimicrobial Resistance Patterns of Enterobacteria from Two Captive Sri Lankan Elephant (*Elephas maximus maximus*) Populations
R.A.P.M Ranatunge Jinadasa; University of Peradeniya

1215-1330 Lunch and poster session

1330-1615 Clinical Medicine Session

Page 36-41

Chaired by: Paolo Martelli, Guillaume Douay, Ki-Jeong Na, Kyung Yeon Eo and Keiko Shimizu

1330-1345 Experimental Study of Ivermectin Toxicity in Red Eared Slider Turtle
Guillaume Douay; Zoo Lyon

1345-1400 Preliminary Study on Oral Microflora of Spectacle Cobra (*Naja naja*), Hump-nosed Viper (*Hypnale spp.*) and Russell's viper (*Daboia russelli*) in a Captive Population from Sri Lanka
S. De Silva; University of Peradeniya

1400-1415 Antimicrobial Resistance of Enterobacterial Isolate from Toque Macaque (*Macaca sinica opisthomerias*) in Peradeniya University Premises, Sri Lanka.
S.S. D. Senadheera; Tsunami Animal People Alliance; University of Peradeniya

1415-1430 Seroprevalence Survey of Hepatitis B and Vaccine Effectiveness Study in Non-human Primates
Saowaphang Sanannu; Dusit zoo

1430-1445 Case Report: Enucleation and Bullet Extraction from the Base of Cavum Orbita of *Macaca fascicularis* in Kalaweit Gibbon Conservation Center and Sanctuary
Lina Susanti; Kalaweit Gibbon Conservation Center and Sanctuary

1445-1500 Tea break

1500-1515 A Review of 4 Pyometra Cases in Aged Captive Wild Felids at Dusit Zoo, Thailand
Wanlaya Tipkantha; Zoological Park Organization of Thailand

1515-1530 Inflammatory Bowel Disease in a Clouded Leopard (*Neofelis nebulosa*)
Joe, Jun Cheng Guo Guo; Taipei Zoo

1530-1545 Diagnostic Laparoscopy for Leopard Cat (*Prionailurus bengalensis*) with Intercostal Abdominal Hernia and Hepatic Lipidosis
Seong-Chan Yeon; Gyeongsang National University

1545-1600 3D Printed Prosthetic Slipper for helping a Duck Rehabilitating from Left Tarsometatarsus Fracture
Chia-Da Hsu; National Taiwan University

1600-1615 Immobilization and anesthesia of free-ranging Formosan Black Bear (*Ursus thibetanus formosanus*) with dexmedetomidine-tiletamine-zolazepam combination - How veterinaries help endangered species conservation in remote mountains
Chun-Hao Chang; National Taiwan University

1615-1730 Pathology and Parasitology Session

Page 41-44

Chaired by: Chian-Ren Jeng and Reuben Sharma

1615-1630 Molecular Epidemiological and Pathological Studies of Rabies in Ferret Badgers in Taiwan

Yang-Chang Tu; National Taiwan University and Animal Health Research Institute

1630-1645 Ovarian Tumor in Malayan Sun Bear (*Helarctos malayanus*): A Case Report
Piyaporn Kongmakee; Zoological Park Organization of Thailand

1645-1700 Pulmonary/Air Sac Carcinoma in a White-bellied Sea Eagle (*Haliaeetus leucogaster*)
Susanne, Je-Han Lin; National Taiwan University

1700-1715 A preliminary Study on Gastrointestinal Parasites of Three Species of Home Garden Rodents in Central Sri Lanka

Manjula Jayasinghe; University of Peradeniya

1715-1730 Case Report: Diversity of *Theileria spp.* of Domestic Cattle and Wild Bovidae in Thailand.

Worawidh Wajjwalku; Kasetsart University

1730 Closing ceremony

Page 45

-Announcement for 2016 meeting

-Opportunity for publishing wildlife science papers on Journal of Veterinary Medical Science (JVMS)
Junpei Kimura; Seoul National University

-Closing remarks:

Tin Tin Myaing (Myanmar Veterinary Association)

Tokuma Yanai (ASCM)

Post-congress Workshop

19th October

Yangon Zoological Garden tour

Organized by Myanmar local committee

1. Culture isolation of *Anaplasma phagocytophilum* from black-striped field mice (*Apodemus agrarius*)
Hyunkyu Jang / Nam Sik Shin; Seoul National University
2. Cardiorespiratory Dose-response Relationship of Isoflurane in Cinereous vulture (*Aegypius monachus*) during Spontaneous Ventilation
Seong-Hoon Seok / Seong-Chan Yeon; GyeongNam WildLife Center, Gyeongsang National University
3. Geotrichosis in a Prairie Dog
Boon Nie Yeoh / Boon Nie Yeoh; Melaka Zoo and Night Safari
4. Cervical Carcinoma in a Male Black-Tail Prairie Dog (*Cynomys ludovicianus*)
Peggy Huang / Peggy Huang; Taipei zoo
5. Endoscopic Removal of Gizzard Metal Foreign Bodies in a Laying Hen
Moo-Hyun Sung / Ki-Jeong Na; College of Veterinary Medicine, Chungbuk National University
6. Fennec Fox (*Vulpes zerda*) with Hematometra associated with Endometrial Hyperplasia
Myung-Kyo Seo / Ki-Jeong Na; College of Veterinary Medicine, Chungbuk National University
7. Infectious Pododermatitis in the Captive Asiatic Black Bears (*Ursus thibetanus*)
Hyo-Min Kang / Ki-Jeong Na; College of Veterinary Medicine, Chungbuk National University
8. Genetic sex determination and polymorphism analysis of CHD gene in Gaviiformes
Yun-Gi Kim / YoungMin Yun; Jeju Wildlife Rescue Center, Jeju National University
9. External Physical Measurement for Goral (*Naemorhedus caudatus*)
Youngjin Choi / Jongtaek Kim; College of Veterinary Medicine, Kangwon National University
10. Sexual Dimorphism in Eurasian Otter (*Lutra lutra*) of South Korea by Craniodental Study with Geometric Morphometrics
Alice Lau Ching Ching /Junpei Kimura; Seoul National University
11. Hematological and Biochemical Analysis of Rescued Goral (*Naemorhedus caudatus*) and Captive Goral
Sangjae Lee / Jongtaek Kim; College of Veterinary Medicine, Kangwon National University
12. Haematology and Biochemistry Parameters of Confiscated Sunda pangolins (*Manis javanica*) in Thailand
Warisara Thomas / Warisara Thomas; Zoological Society of London, Thailand branch
13. Hematology and Blood Biochemistry Reference Values for Captured Wild Kestrels (*Falco tinnunculus interstinctus*)
Yoorhim Cha / Jongtaek Kim; College of Veterinary Medicine, Kangwon National University
14. Establishment of Reference Intervals of Hematologic and Serum Biochemical Values in the Oriental White Stork *Ciconia boyciana*
Jae-Ik Han / Ki-Jeong Na; College of Veterinary Medicine, Chungbuk National University
15. Recent Findings of the Myanmar Timber Elephant Research Project
Khyne Mar / Khyne Mar; University of Sheffield, UK

16. Occurrence of Parasitic Infestations in Myanmar Timber Elephants
Hla Myet Chel / Hla Myet Chel; Department of Pharmacology and Parasitology, University of Veterinary Science, Nay Pyi Taw
17. *Clostridium perfringens* type A Infection in an Asian Elephant (*Elephas maximus*): A Case Report
Pakkanut Bansiddhi / Pakkanut Bansiddhi; Faculty of Veterinary Medicine, Chiang Mai University
18. Molecular Epidemiology of Rabies Viruses in Taiwan, 2013-2015
Wei-Cheng Hsu / Wei-Cheng Hsu; Animal Health Research Institute
19. Raccoon Dogs Rabies Monitoring in South Korea
Sungsoon Choi / Jongtaek Kim; College of Veterinary Medicine, Kangwon National University
20. Infectious Disease Monitoring of Wild Mammals in Gangwon Province
Seongeun Seo / Jongtaek Kim; College of Veterinary Medicine, Kangwon National University
21. Surveillance Study of Wild Birds for West Nile Virus in Gangwon Province
Seongjae Choi / Jongtaek Kim; College of Veterinary Medicine, Kangwon National University
22. Severe Fever with Thrombocytopenia Syndrome Virus in the Wildlife of Korea
Joon-seok Chae / Joon-seok Chae; College of Veterinary Medicine, Seoul National University
23. Avian Influenza Virus Surveillance of Wild Birds in Korea during Fall Migration Season
In Pil Mo / In Pil Mo ; Chungbuk National University
24. Canine Distemper in Free-Ranging Formosan Gem-Faced Civets in Taiwan
Yang-Chang Tu / Yang-Chang Tu; National Taiwan University and Animal Health Research Institute
25. Ventricular Thrombosis Secondary to Salmonellosis in a Black-naped Hare (*Lepus nigricollis*)
Manjula Jayasinghe / Manjula Jayasinghe; University of Peradeniya
26. Calcific Periarthritis in Binturong (*Arctictis binturong*): A Case Report
Wijit Banlunara / Wijit Banlunara; Department of Pathology, Fac. of Veterinary Science, Chulalongkorn University, Bangkok
27. Uterine Adenocarcinoma with Lung Metastasis in a Formosan Sika Deer (*Cervus nippon taiouanus*)
Hsuan Kuo / Victor Fei Pang; National Taiwan University
28. Cystic Thymoma in a Red Panda
Susanne, Je-Han Lin / Chian-Ren Jeng; Graduate Institute of Molecular and Comparative Pathobiology, School of Veterinary Medicine
29. Thymic Cyst with Spindle Cell Thymoma in a Barbary Sheep (*Ammotragus lervia*)
Wen-Ta Li / Wen-Ta Li; Graduate Institute of Molecular and Comparative Pathobiology, School of Veterinary Medicine, National Taiwan University
30. Study on Acute Gastroenteritis in Red Kangaroos
Than Naing Soe / Than Naing Soe; Myanmar
31. Captive Breeding; the Pro and Cons
Thaw Thaw Linn / Thaw Thaw Linn; Myanmar

32. Detection and Molecular Characterization of *Cryptosporidium spp.* among Wild Rodents and Insectivores in South Korea

Jaehak Park / Jaehak Park; Seoul National University

33. Genetic Analysis in Slow Lorises (Genus *Nycticebus*) in Thailand

Hiroko Somura / Hiroko Somura; Jikei University School of Medicine

34. Concentration of E1C, PdG, FSH in aged Captive Borneo Orangutans

Misato Hirai / Misato Hirai; Okayama University of Science

35. Case Report: Self-mutilation Tendency on Injured Gibbons

Lina Susanti / Lina Susanti; Kalaweit Gibbon Conservation Center and Sanctuary

36. Case Report: Lymphoma/Leukemia in Four Non-human Primates

Chia-Da Hsu / Chian-Ren Jeng; Graduate Institute of Molecular and Comparative Pathobiology, School of Veterinary Medicine

37. Application of a Non-Invasive Oral Sampling Technique for Zoonotic Pathogen Surveillance in Nonhuman Primates in Cambodia, Lao PDR and Viet Nam

Nguyen Thi Thanh Nga / Nga Nguyen; Wildlife Conservation Society

Full Paper:

Measurement of Cortisol Levels in Pregnant Asian Elephant (*Elephas maximus*)

Page 65

Patcharapa Towiboon; Chiang Mai University

Event Timetable

Page 70

Abbrivation of Scope

Page 71

Oral-JO-1

Mycobacteriosis in Wildlife in New Zealand: A One Health Issue

Maurice Alley

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Although bovine tuberculosis probably came to New Zealand soon after the first cattle in 1814 it was not recognised as a serious problem until the 1930's when high rates of tuberculosis in children drinking unpasteurised milk were identified. This gave rise to a voluntary test and slaughter eradication scheme for dairy cattle which became compulsory in 1961. The number of infected cattle herds then fell rapidly until 1980 when it was found that many were becoming reinfected from wild possums. The number of infected cattle and deer herds then began to rise again alarmingly and the brush-tailed possum was defined as the main reservoir of *Mycobacterium bovis* in NZ. It was found to transmit the disease not only to cattle but also deer, pigs, mustelids, hedgehogs, cats, sheep, goats and humans. In cattle and deer, tuberculosis is a slowly progressive respiratory disease which produces granulomatous lesions in the lungs and lymph nodes of the head and neck. Whereas in possums, the lesions are very different and consist of soft, almost suppurative abscesses in the superficial nodes which are thin walled and may rupture producing sinuses excreting large numbers of organisms. Lung lesions are also common and transmission between individuals occurs via licking, respiratory aerosols and skin wounds during den sharing, mating and territorial disputes. Cattle and deer may sniff and lick the normally nocturnal, infected possums when they emerge in the daylight. Other wild animals become spillover hosts by scavenging infected possum carcasses. A National Pest Management Strategy was introduced in 1995 to reduce the spread of the disease and the reinfection of cattle and deer herds by wildlife vectors. The country was classified into TB Vector Risk Areas and TB Vector Free Areas depending on the TB status of wildlife in the region. The scheme used three main methods of disease control in the risk areas; TB test and slaughter of cattle and deer reactors, the control of movement of cattle and deer from infected herds and the reduction of possum numbers in the risk areas to low densities. This strategy was successful in reducing the annual infected herd prevalence to <0.2% by 2011. Technical developments over the last 10 years have included, the development of an oral BCG vaccine that could be used in free living possums, the development of a gamma interferon test to improve diagnostic specificity in cattle and the development of improved DNA typing methods. Other *Mycobacteria* found in wildlife in New Zealand include *M. avium* (harriers, penguins, parakeets, kiwi, pigs and deer) and *M. pinnipedii* which is found in seven species of seals and sea lions in Australian and New Zealand waters.

Presenter: Maurice Alley

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Oral-JO-2

Tuberculosis in a Female African Elephant: A Case report

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Tuberculosis is an airborne, zoonotic disease, caused by *Mycobacterium tuberculosis* complex. In elephants, *Mycobacterium tuberculosis* is the predominant disease-causing agent, although cases caused by *Mycobacterium bovis* have also been reported. A twenty-four year old, lactating, female African elephant in Nakorn Ratchasima Zoo showed signs of depression and later went down into right

lateral recumbency. The elephant was treated successfully and showed no further clinical signs. However, two month later she died. Necropsy results showed red hepatization with yellow diffuse nodules in the caudal lung lobes and serous atrophy of the coronary fat. Laboratory results showed positive acid fast bacilli from the impression smears of the nodules. Pseudomonads spp. was cultured from the necrotic nodules and Mycobacterium tuberculosis was detected from the lung tissue using PCR. The final diagnosis of this elephant was tuberculosis associated with secondary bacterial infection. After the female died, samples were collected from the other three African elephants in the same exhibit and tested with the Elephant TB STAT-PAK® Assay which all resulted in negative for tuberculosis. The Zoological Park Organization and its partners have been working collaboratively under Thailand Elephant Tuberculosis Task Force since 2010. Tuberculosis monitoring program is routinely implemented for elephants under ZPO cares. The health of the zoo keepers and veterinary team are also currently monitored.

Keywords: Tuberculosis, African elephant, Mycobacterium tuberculosis, Nakorn Ratchasima Zoo

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Oral-JO-3

Genetic Feature of *Mycobacterium bovis* isolated from Japanese Sika Deer (*Cervus nippon centralis*) in Zoological Garden in Osaka

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In October 2009, 2-years-old female sika (sikaA) bred in a zoological garden located in northern part of Osaka prefecture died after respiratory symptoms and from her necropsy specimen *M. bovis* was isolated (Mb A). Following this diagnosis, the tuberculin skin tests were done, and five out of 24 sika kept in the paddock of the garden showed positive or suspected reactions and sacrificed. From one destroyed sika (sikaB), another *M. bovis* isolate was isolated (Mb B). In January 2010, another sika (sikaC) died and was diagnosed with tuberculosis in the basis of necropsy, *M. bovis* was isolated (Mb C) from this deer, too. Twelve of the remaining 18 deer showed positive reaction to the tuberculin test. In the end, all the deer in the garden were sacrificed in February, 2010. Three Mb isolates genotyped by using spoligotyping and variable number of tandem repeats (VNTR), and Two of Three (MbA and MbB) Mb isolates were analyzed single nucleotide polymorphism (SNP) by genome wide mapping using Illumina-based short reads. Three isolates show the identical spoligotype and identical VNTR profiles. By contrast, the result of genome wide mapping showed that 13 single nucleotide variants (SNVs) were accumulated between MbA and MbB. This is the first report of genome wide comparison of Mb isolates isolated in Japan. While this outbreak of deer Mb was supposed to be caused by direct Mb transmission from sikaA to sikaB and C by the incidence process and genotyping, as many as 13 SNVs were found between MbA and MbB; In *M. tuberculosis*, the isolates show the 13 SNVs cannot be considered as clonal isolates. The reason of high multitude of SNVs between MbA and MbB is unclear at present. Possibly because the speed of SNP accumulation in Mb may be more rapid than in Mtb, or the duration Mb transmitted among the sika cluster in the garden might last for a long period.

Presenter: Aki Tamaru

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Oral-JO-4

Molecular Characterization of *Mycobacterium orygis* Isolates from animals of South Asia

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Mycobacterium orygis, a new member of *Mycobacterium tuberculosis* complex (MTC) species cause tuberculosis (TB) in humans and animals. We have isolated this bacterium from wild animals in Nepal and captured monkeys and dairy cattle in Bangladesh. MTC isolates from a spotted deer (*Axis axis*) and a blue bull (*Boselaphus tragocamelus*) in Nepal were included in the study and MTC isolates from a dairy cattle herd and captured rhesus monkeys (*Macaca mulatta*) in Bangladesh were included. Most of these animals had TB suspected lung lesions and these lesions were cultured in LJ media. Spoligotyping, mycobacterial interspersed repetitive units-variable number of tandem repeats (MIRU-VNTR), region of difference analysis (cfp32, RD9 and RD12) and SNP detection were performed to ascertain species and molecular epidemiology of the isolates. All the isolates had a typical spoligotype, SIT587 in SpolDB4 database, corresponding to *M. orygis* and in an agreement with many other reported isolates. RD analysis (cfp32: +, RD9 - and RD12-) and SNP detection of *gyrB*, *mmpL6*, *TbD1*, *PPE55* and *Rv2042c* confirmed the isolates to be *M. orygis*. The MIRU-VNTR analysis of these isolates grouped them into four clusters. Previous studies have reported *M. orygis* from humans in South Asia. These finding suggests its endemic prevalence in the sub-continent. Moreover, genetic diversity of these isolates indicates a long history of prevalence in South Asia. *M. orygis* was isolated from wild and domestic animals in South Asia. These findings can be helpful to understand the situation of tuberculosis in the region.

Presenter: Jeewan Thapa

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Oral-JO-5

Worldwide Occurrence of Tuberculosis in Elephants, Current Diagnostic Technologies, and Future Research

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Tuberculosis (TB) emerged as a disease of concern for captive elephants almost 20 years ago. While our knowledge has advanced, there is still much that we do not understand about this disease in elephants. Questions remain regarding epidemiology, zoonotic risk, treatment, and cure. TB has been diagnosed in elephants in the U.S., Europe, Australia, and several Asian elephant range countries (Thailand, India, Sri Lanka, Laos, Malaysia). Almost all (> 99%) culture-documented cases have been due to *Mycobacterium tuberculosis*, the human strain of TB. Recently, TB has been reported in a wild African elephant and in Asian elephants in India and Sri Lanka, emblematic perhaps of yet another threat to this endangered species from human encroachment and raising concerns for the welfare of small fragmented populations in Asia. Diagnosing TB in elephants is challenging. In elephants, chest radiographs are not an option, the intradermal tuberculin test lacks efficacy, and culture, the gold standard of diagnosis in humans, has inherent limitations as a primary diagnostic technique. Respiratory samples are collected from elephants using a trunk wash technique but obtaining a proper diagnostic sample is difficult. A positive culture is diagnostic, however, failure to isolate the causative organism does not rule out TB. Infected elephants shed TB bacteria intermittently and contamination and

overgrowth of cultures by other organisms is a frequent complication. A commercial serological test, the DPP VetTB® Assay for Elephants (Chembio Diagnostics, Inc., Medford NY, USA) licensed by the United States Department of Agriculture in 2012 as a screening test for TB in elephants has demonstrated excellent sensitivity and specificity and has been shown to predict TB infection months to years in advance of diagnosis by culture. Preliminary work has been performed to investigate the feasibility of using a gamma-interferon assay as a diagnostic method but further work is needed. Nucleic acid amplifications (NAA) tests have been used as adjunct methods of diagnosis, but no one technique has been validated. Research is needed to develop and validate other diagnostic tests, assess biomarkers known to be associated with TB in humans, and conduct additional pharmacokinetic studies of TB drugs. Determining whether the Xpert® MTB-RIF Instrument System,* a NAA test now available in many countries, could be used to diagnose TB in elephants would be an exciting avenue of research that might provide an economical means to sample elephants more frequently. Further pathology and immunology studies are needed to better our understanding of the stages of disease and the immunological response in elephants which appears to differ from humans. Additionally, improved treatment protocols and a means to confirm cure are urgently needed.

* http://www.cdc.gov/tb/publications/factsheets/testing/Xpert_MTB-RIF.htm

Keywords: elephants, tuberculosis, TB, serology, culture, research

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Oral-JO-6

Mycobacteriosis Working Group in ASCM: A Challenge to unite Clinical Cases and Bacterial Information towards One Health

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Genus *Mycobacterium* lives in natural environments such as soil, water, and surfaces on animals and plants. Some species can infect animals and humans as zoonotic pathogens, which cause tumors and granuloma on skins or various organs. In contrast to great efforts against *M. tuberculosis* complex by conservation medicine, putative virulent non-tuberculosis mycobacteria (NTM) has been mostly neglected. Not only their infectiousness but also natural niche, reservoirs, and transmission routes have been still unknown. Systematic surveillance of mycobacteriosis on animal cases and environments based on pathology, culturing, and genetic analysis will be a good target as broad concept of One Health research.

To promote and encourage the research progress, the mycobacteriosis surveillance group focuses on **(1)** advance on diagnostic approach to mycobacterial cases in the Asian society, **(2)** consultation for mycobacterial cases to refine and accumulate case information, and **(3)** construction of collaborative relationship. Putative targets are as follows. Other various approaches will be entirely welcome.

Retrospective clinical samples

Although mycobacteriosis cases are often determined histologically in necropsy, the detailed species have been rarely investigated. Frozen specimen, formalin-fixed paraffin-embedded (FFPE) samples, and even slide glasses used for acid-fast staining can be used as PCR templates to determine the species. Because such samples have been diagnosed as mycobacteriosis and generally easy to avoid contamination of live non-pathogenic mycobacteria, pathogenic species might be determined more

reliably than new cases. Accumulated samples from certain epidemiological backgrounds (such as cases in a zoo, in a restricted area, or of related species) can be regarded as retrospective surveillance, which will be a good target as a research.

New cases

When new mycobacterial cases are found, various investigations such as culture of pathogens, environmental surveillance will become available. It is technical to culture mycobacterial species efficiently even from fresh samples. DNA techniques are applicable to the investigations easily, although contamination from environmental resources should be taken care of.

Determination of Mycobacterial species

For the purposes of detection and determination of mycobacterial species from various samples, PCR with specific and sensitive primers, DNA sequencing of marker genes (such as ITS, 16SrDNA, hsp65 and rpoB) can be utilized. Specific primers and kits are also useful to detect some species. In our experiences, real-time PCR for specific targets with short nucleotide length is suitable to retrospective samples because DNA molecules are often highly degraded.

We hope the working group can support research activity for understanding of genus mycobacterium, which will contribute to animal conservation and human public health in Asian countries through risk assessment as zoonotic agents. Current participants and advisers are as follows. Indonesia, Joko Pamungkas; Japan, Hideyuki Ito, Nobuhide Kido, Aki Tamaru; Korea, Junpei Kimura; Myanmar, Ye Htut Aung; Taiwan, Chen-Chih Chen, Shih-Chu Chen, Jun-Cheng Guo, Jai-Chyi Pei; Thailand, Wijit Banlunara, Achariya Sailasuta; Vietnam, Nguyen Truong Son; WDA, Pam Lizette Whiteley.

Keywords: Mycobacteriosis, Pathology, Microbiology, Genotyping

Presenter: Takayuki Wada

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Oral-JO-7

Evaluation of *Mycobacterium kansasii* as Zoonosis Pathogen by “One Health Infectious Animal Model”

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The ecology of non-tuberculous mycobacteria (NTM) was emphasized today, partly because the prevalence and incidence of potentially pathogenic mycobacteria is increasing in humans and animals, and partly because the genetic characteristics of mycobacteria are further well understood by epidemiological methods. The fact that NTM are inhabitants of environments indicates that humans and animals are surrounded by mycobacteria and it, thus, provides us a risk. There were infectious cases of *M. kansasii* in two black bearded Sakis (*Chiropotes Satanas*) in a zoo. Although we did not yet identify genetically transmission route of *M. kansasii*, albeit repeatedly observed disseminated disease, the surrounding evidences suggests an oral mode of infection from environments with high plausibility. To illuminate the contributing factors leading to increased susceptibility of infection in animals, we developed “One-Health infectious animal model” using squirrel monkeys (*Saimiri sciureus*) as the

complete infection examination for testing a seed-lot both the reference strain from a HIV-negative patient and clinical strain derived from animal. Thus, we investigated whether this assay could address the overlapping pathogens between hosts. There were similarities between those strains in terms of parameters such as gross lesion scores, histopathology of lesions, and culturing *M. kansasii* from organs. Therefore, we assessed the virulence of *M. kansasii* as distinctly high. Our results strongly supported the hypothesis that reservoir represents the most probable source of pathogenic *M. kansasii* isolates. In our presentation, it is shown those mycobacterial characteristics that determine its range of pathogens, included the comments on the available microbiological and genetic methods.

Keywords: *Mycobacterium kansasii*, squirrel monkey, virulence, One-Health

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Oral-JO-8

Systemic Spirorchidiasis and Mycobacteriosis in a Green Sea Turtle (*Chelonia mydas*)

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A green sea turtle (*Chelonia mydas*) found floating in the sea nearby the coast was rescued and sent for rehabilitation. She presented with anorexia, imbalance, and nasal foamy discharge, and died following 2 days of supportive treatment. Postmortem examination revealed multiple variably sized, mottled white yellow, firm nodules throughout almost all organs. Histopathological findings included multisystemic necrogranulomas with intralesional coccobacillous bacterial colonies and ova granulomas containing many brown-pigmented shells of spirorchiid trematode eggs. Besides, sections of an adult trematode, with no cuticle but having a real coelom and genital system containing numerous oval ova, were present on the mucosal surface of GI tract. While Gram or GMS staining revealed no positive reaction, Ziehl–Neelsen staining demonstrated a few acid fast-positive, beaded bacilli in the macrophages or scattered extra-cellularly around the granulomas. Further molecular confirmation of spirorchiid and mycobacterial infections is under processing. Spirorchidiasis is usually chronic and debilitating, and only occasionally kills the turtles if severe enough. Mycobacterium is generally an opportunistic pathogen in marine animals. The species of the Gram-negative coccobacillous bacteria and its pathogenicity are not known. The leading cause of the turtle's death is considered due to the devastating multisystemic organ failure secondary to the disseminated combined spirorchidiasis, mycobacteriosis, and undetermined Gram-negative bacterial infection.

Keywords: Green sea turtle, Spirorchidiasis, Mycobacteriosis

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Oral-JO-9

High Mortality Event of Hong Kong Newt (*Paramesotriton hongkongensis*) in Taipei zoo

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A high mortality event of Hong Kong newt (*Paramesotriton hongkongensis*) occurred during Nov 2014 to Jun 2015 in Taipei zoo. Predominant histopathological findings were multifocal necrotic foci in liver, spleen, and kidney with no or minimal mononucleated inflammatory cell infiltration and abundant acid-fast positive bacilli around the lesions. There were also multifocal to coalescing skin ulcerations with intralesional fungal hypha morphologically consistent with *Saprolegnia* spp. Diffusely, the skeletal muscles showed varying degrees of degeneration characterized by swelling, increased eosinophilia, vacuolation, and fragmentation. The DNA of Mycobacterium spp. was detected via PCR by using the set of primers targeting the heat-shock protein genes (hsp65), and purified PCR amplicons were directly sequenced. The result of DNA sequencing was 100% identical to the corresponding portion of *Mycobacterium marinum* (*M. marinum*). The lesions in these cases caused by *M. marinum* are multiple necrotic foci, which are quite different from the conventional granulomatous lesions seen in mycobacteriosis. The infection of *M. marinum* and *Saprolegnia* spp. could be associated with impaired immune function caused by natural (decreased temperature) and anthropogenic stressors (inappropriate manipulation of these animals). The possibility of anthropogenic stressor is supported by the presence of myodegeneration (capture myopathy) in most newts. This is the first report of *M. marinum* infection in Hong Kong newt.

Keywords: *Mycobacterium marinum*, mycobacteriosis, *Saprolegnia* spp., Hong Kong newt

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Oral-ZVN-10

An Over View on Medical Care for Injured Free-ranging Avian and Mammalian Species Performed by the Wild Animal Medical Center of Rakuno Gakuen University Between 2003 and 2014

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Wild Animal Medical Center (WAMC) which is in the Teaching Animal Hospital of the School of Veterinary Medicine, Rakuno Gakuen University (RGU), Japan, has admitted wild animals from surrounding area for treatment as a part of its activities. According to the data used in the 5th International Wildlife Management Congress, Sapporo, Japan, July 26-30, 2015, in total, 90 avian and 16 mammalian species were brought into WAMC including a Peregrine falcon and an Ussuri tube-nosed bat which are in the Red Data Book issued by the Ministry of the Environment, Japan, between 2003 and 2014. Number of patients was ca. 10 individuals/year. Most cases were caused artificially, e.g., collisions with buildings (39%), traffic accidents (19%) and so on. Almost 25 % of a total of birds could be released. Mostly common avian species (non-endangered species) were cared for at WAMC, so there were no significant effects on the ultimate goal of conservation of natural ecosystem or a direct improvement for ecosystem management. However, the program had a positive educational effect, because the treatments and care/rehabilitation activities were performed by many undergraduate veterinary and non-veterinary students of RGU, and, for example, the injured falcon was used for impressive lectures to primary and high school students. The present review was supported in part by the Supported Program for the Strategic Research Foundation at Private Universities (2013-2017) and a Grant-in-Aid (No. 26460513) of the Ministry of Education, Culture, Science and Technology, Japan.

Keywords: Medical care, injured free-ranging species, Wild Animal Medical Center

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Oral-ZVN-11

ASCM Started Collaboration with Global Networks for Wildlife Disease Surveillance

Tokuma Yanai, Nabin Rayamajhi, Junpei Kimura, Takayuki Wada*

Asian Society of Conservation Medicine (Boards); *Nagasaki University, The Institute of Tropical Medicine

Since its first meeting at Kasetsart Univ. in 2005, the Asian Society of Conservation Medicine (ASCM), which had established for zoo and wildlife medicine, has convened annually, with the goal of “One Health in Asia Pacific” to establish an Asian network for conservation medicine including zoonotic or wildlife diseases surveillance. Through annual meetings we had gotten various networks with hosted veterinary colleges such as Chulalongkorn (2006), NTU (2007), BAU (2008), SNU (2009), UPM (2010), Tribhuvan (2011), Mahidol (2012) and VNUA (2014), and occasionally with local veterinary associations in developing countries. Through this Asian scientific platform/network we tried to get adjustment for both technical (wildlife management, diseases control) and cultural (communication language, cultures) levels for collaboration. These decades we still have been gotten frequent emerging or reemerging diseases such as SARS, HPA, rabies and mycobacteriosis, in humans as well as animals, some of which came from wildlife or the environment. There have been increasing demands to establish and strengthen wildlife health surveillance. This decade our society has been trying to establish wildlife health surveillance in Asian countries based on the idea of “One health”. However, we have had no afford to cooperate with other local or grovel organizations to cope with emerging or reemerging wildlife diseases control with frequent border-less expansion. Next logical step should be to connect our Asian network to other wildlife health networks for a wider geographical level. At the 6th annual meeting in Singapore in 2013, we proposed to seek collaboration with other grovel networks like WDA, and had continued discussion on this challenge. Based on these discussion ASCM/ASZWM boards sent people to the 63rd WDA annual meeting in Albuquerque for some discussion with WDA boards, and got some agreement about collaborations such as start of WDA/ASCM Joint session for wildlife health surveillance. At 64th WDA annual meeting in Brisbane, ASCM boards and Asian colleagues had discussion with WDA board’s members to promote more collaboration, and a future jointed meeting with WDA was discussed. We should to continue to improve the international coordination, and to promote integration with similar health surveillance programs for livestock and public health.

Keywords: Wildlife Health Surveillance, grovel network, WDA

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Oral-ZVN-12

Networking: The Whooping Crane Health Advisory Team Example

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The development of a team of veterinarians to consult for the recovery efforts of the North American Whooping Crane (*Grus americana*) may serve as an example to networks for threatened Asian species (Hooded Crane (*G. monacha*), White naped crane (*G. vipio*), and Red-crowned Crane (*G. japonensis*) and other taxa. Founded in 1992, the Whooping Crane Health Advisory Team consists of consulting veterinarians and wildlife disease experts whose mission is to provide recommendations and expertise

to the International Whooping Crane Recovery Team on issues of health management and disease risk to conservation projects for this species. The group consists of 6 core contributors from different organizations (zoos, NGOs, regional and federal government agencies), along with several secondary cooperating zoo veterinarians. There is no formal membership, but an individual volunteer coordinates and distributes communications to the group and summaries to the recovery team in a timely fashion. Workshops have occurred infrequently; meetings with a subset of core contributors occur regularly within the various projects; and annual conference calls and email constitute the primary communications platforms. The recent declaration of the Whooping Crane Species Survival Plan will invigorate the group through involvement with the Gruiformes Taxon Advisory Group of AZA and its Crane Health Advisor position and annual reporting requirements. Maintenance of this network to the broader zoological and wildlife veterinary community has been maintained through regular peer-reviewed publications and engagement with the American Association of Zoo Veterinarians, Wildlife Disease Association, the IUCN Crane Specialist Group, and IUCN Wildlife Health Specialist Group.

Keywords: Crane, Gruiformes, veterinary network

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Oral-ZVN-13

Enhancing One Health: Integrating Toxicological and Infectious Disease Research for a More Holistic Approach

Patricia Bright

U.S. Geological Survey- Environmental Health

Animals and people can be exposed to multiple types of disease agents (both contaminants and pathogens) from a variety of pathways. Scientists, including those taking a One Health approach, traditionally have studied the effects of individual disease agents or classes of disease agents—for example, the effects of a pathogen or the effects of exposure to a contaminant. We have begun to understand that concurrent exposure to different classes of disease agents can have significant interactions, thereby contributing to an overall adverse biological outcome. This complexity poses a unique challenge for the natural science and public health communities. This presentation will discuss the need for a new approach to One Health—one that encompasses complex disease processes involving interactions among multiple risk factors including toxicant exposures and pathogens.

Keywords: One Health, infectious disease, toxicological disease

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Oral-DE-14

Why does population density matter and how to estimate it? Using ferret-badger, a principle reservoir of rabies in Taiwan, as an example

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During the rabies outbreak in 2013-2014, our surveillance in the Luanshan and Chenggong area, Coastal Mountain Range, Taitung County, found a severe population impact of rabies on ferret-badger population. However, the relationship between population density of reservoir and the transmission of

rabies is remained unclear and it is critical information for disease management and control. In this study, we improved the efficiency of ferret-badger trapping and significantly increased the capture rate of ferret-badger compared to the study before. The improved capture rate and trapping skill could largely contribute to rabies control measures, such as oral vaccine strategy and rabies surveillance. We then conducted a standard method for estimating the absolute population abundance of ferret-badger with the “mark-resight model” in another study area, Shan-ping, Kaohsiung city. Estimated absolute population abundance (AA) was used to compare with the photographic rate (photographs per sampling time; PR). Our initial data found that PR was not correlated with the AA. It is, therefore, necessary to be aware when using PR as a population abundance indicator. In addition, for oral vaccine or other rabies control measures, the accurate calibration of PR to AA will be needed. Rabies transmission is highly related with reservoir density, either based on the density dependent or frequency dependent hypothesis. By integrating population density monitoring and rabies surveillance as shown in our research, we will be able to clarify the relationship between reservoir density and rabies transmission in Taiwan. Those are crucial information for strategy development for rabies control and wildlife conservation.

Keywords: ferret-badger, *Melogale moschata*, capture rate, population density estimation, rabies transmission

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Oral-DE-15

Canine Distemper Virus in the Bufferzone of Chitwan National Park, Nepal – Threats to Wild Carnivore Populations

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Canine distemper virus (CDV) is distributed worldwide and infects a wide range of carnivore species. Disease reservoirs are most often found in domestic dog populations. Recent reports indicate the potential for CDV to spillover and impact recovery of even small populations of wild carnivores such as tigers (Martin, G. 2015). It is reasonable to assume that this disease is a potential threat to critical carnivore populations in Nepal. Chitwan National Park (CNP) is home to 120 Bengal tigers and 23 other potentially susceptible carnivore species (6 listed in CITES Appendix I). CDV has never been diagnosed in any of these species to date. A serologic study was conducted in four CNP bufferzone communities to detect the exposure to CDV in domestic dogs and establish the potential threat for wild carnivore species of concern. A total of 100 canine serum samples (25 from each village) were analyzed for CDV antibody by serum neutralization assay at Washington Animal Disease Diagnostic Laboratory in Pullman, WA, USA. Overall, 27% (range 8-50%) of dogs sampled had positive antibody titers to CDV. Some dogs had been vaccinated for rabies (up to 58% in one village), but none were previously vaccinated for CDV. We conclude that CDV is present in dogs living near CNP and may pose a threat to endangered carnivore species. Further investigation should be conducted to determine if any wild carnivores have been affected by this disease and appropriate policies need to be developed to prevent disease risk to endangered species.

Keywords: Canine distemper virus, carnivore conservation, spillover

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Oral-DE-16

Zoonotic Simian Malaria in Peninsular Malaysia: Molecular Epidemiology and Spatial Distribution

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The malaria parasite *Plasmodium knowlesi* has recently been recognised as a major zoonotic pathogen, being transmitted from macaques to humans in Southeast Asia. This study was undertaken to ascertain the molecular epidemiology and spatial distribution of *P. knowlesi* infecting Long-tailed Macaques (*Macaca fascicularis*) on the west coast of Peninsular Malaysia. A total of 781 blood samples were collected from wild *M. fascicularis* captured from 77 locations representing four different habitats; urban, sub-urban, plantation/orchards and secondary forest. Screening for *P. knowlesi* infection was conducted using nested PCR targeting the 18S SSU rRNA. The overall prevalence of *P. knowlesi* infection among the macaques was 13.4%. Macaques inhabiting the plantation/orchards were the most infected, followed by sub-urban areas secondary forest, and urban areas. The adult macaques showed the highest prevalence of *P. knowlesi* infection, followed by the juveniles and sub-adults. Spatial distribution analysis revealed a number of hotspots of infection on the west coast of the country. With the increasing destruction of forest habitats for human activities, the wild macaques have been driven closer to human inhabitations, thus narrowing the disease transmission interface. At the present moment, the Anopheline mosquito vectors capable of transmitting the parasite are confined to the forest, and human infections can be traced back to activity in these areas. Comprehensive epidemiological investigations should be carried out in the Southeast Asian region to shed more light on the host and vector diversity, as well as the transmission dynamics of this important zoonotic disease.

Presenter: Reuben Sharma

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Oral-MM-17

Our Understanding on the Sperm Whale (*Physeter macrocephalus*)

Tadasu K. Yamada

National Museum of Nature and Science

The sperm whale (*Physeter macrocephalus*) is an impressive odontocete species. Male sperm whales can reach around 20m, and claims a status of the largest odontocete. The species is sexually dimorphic and with females remain around 12 m. In cetaceans, proportionate size of the head becomes larger in larger individuals, which seems to be paradoxical. The huge head is consisted of the case, filled up with the spermaceti and the junk which is equivalent to the melon of ordinary odontocetes, resting on the rostrum of the skull. The widely spread interpretation of spermaceti organ by Clarke (1978), cooling and warming of the spermaceti enable relative density adjustment to facilitate the whale to dive and surface, is no longer accepted. However, spermaceti organ as a medium to let sound go through (eg. Norris and Harvey, 1972) is more widely accepted. Asymmetry of the soft tissue structure of the odontocetes in general is extremely advanced in the sperm whale. The right nasal passage is understood to contribute to sound production with the monkey lips at the rostral end, whereas the left passage functions as the air passage for the respiration. This extreme asymmetry made the skull structure

dramatically asymmetrical. The species is known for the extremely deep and long dive reaching deeper than 1,000m and longer than 60 min. Major prey species are reported as deep sea squids of various species.

Keywords: sperm whale, biology,

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Oral-MM-18

Retrospective Study of Skull Trabecula-like Lesions in Cetaceans around Taiwanese Waters

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Crassicauda spp. could cause irreversible trabecula-like lesions on skull and damage to adjacent tissues, and thereby lead to mortality and stranding of cetaceans. However, the differences of negative health impacts caused by *Crassicauda spp.* in different cetacean species are still undetermined. Therefore, a retrospective study is proposed. Skull specimens of stranded/bycatch cetaceans, all held in national museum, were investigated for trabecula-like lesions, and the lesions were categorized by severity and location. In the present study, 339 skulls from 6 species, including bottlenose dolphin (*Tursiops spp.*), Risso's dolphin (*Grampus griseus*), pantropical spotted dolphin (*Stenella attenuata*), spinner dolphin (*Stenella longirostris*), Fraser's dolphin (*Lagenodelphis hosei*), and rough-toothed dolphin (*Steno bredanensis*), were investigated. Totally, 70 skulls had trabecula-like lesions (20.6%), and the prevalence ranged from 0% to 31.7% among different cetacean species. Significantly more trabecula-like lesions in *S. attenuata* were severe and located at nasal region. In contrast, significantly more trabecula-like lesions in *G. griseus* were mild to moderate severity, and relative more lesions were located at auditory region. The lesion severity might be directly correlated with the length of time after infection due to its irreversible and progressive nature, and the lesions at auditory region might cause harmful effect on the echolocation of cetaceans. Therefore, our results indicate 1) the status of *Crassicauda spp.* infestation is different among different cetacean species, 2) lesion location could be an important factor for host health in; 3) *Crassicauda spp.* might be more harmful for *G. griseus* rather than *S. attenuata*.

Keywords: *Crassicauda spp.*, cetacean, trabecula-like lesions

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Oral-MM-19

Persistent Environmental Pollutants in Asian Coastal Waters---Contamination of Dolphin Brains

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Persistent organic pollutants (POPs) such as polychlorinated biphenyls (PCBs) bioaccumulate to the animals in high trophic level including dolphins. Although these compounds are stable in the environment, many high trophic animals have detoxication mechanisms for elimination. PCBs are partly transformed to hydroxylated metabolites (OH-PCBs) by cytochrome P450 enzymes (CYP), and excretion is promoted by conjugation enzymes. A part of these metabolites structurally resembles thyroid hormone (TH) that is indispensable to a brain development and is known to cause cognitive and neurodevelopmental toxicities. In this study, blood and the brain samples were collected from 7 cetacean species stranded or by-caught along Japanese coasts were determined, including finless porpoises (*Neophocaena phocaenoides*, $n = 15$), striped dolphins (*Stenella coeruleoalba*, $n = 5$), melon-headed whales (*Peponocephala electra*, $n = 5$), killer whales (*Orcinus orca*, $n = 2$), Dall's porpoises (*Phocoenoides dalli*, $n = 2$), a minke whale (*Balaenoptera acutorostrata*, $n = 1$) and a fin whale (*Balaenoptera physalus*, $n = 1$). The levels and accumulation patterns of PCBs and OH-PCBs were examined. Levels of the compounds in the blood and brain had positive correlations among each other ($p < 0.05$), indicating the possible penetration of these compounds through the blood-brain barrier. OH-PCBs were detected from all the brain samples analyzed (6.5 - 3600 pg/g wet wt.), and several cetacean species (e.g. killer whales, Dall's porpoises, melon-headed whales) have exceeded the inhibitory level of TH-mediated gene transcription using human brain cell lines. These results suggest possible adverse effects of these compounds on cetaceans, and further studies are required for the risk assessment of wild marine mammals.

Keywords: environmental pollutants, PCBs, dolphin, whale, brain

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Oral-MM-20

Current Status of Marine Mammals in Myanmar.

Tint Tun

Marine Science Association Myanmar (MSAM)

The Republic of the Union of Myanmar has 1280 km coast. Myanmar is a significant country for cetaceans as type example of the Bryde's whale was collected from Myanmar coast and common name of a dolphin, Irrawaddy dolphin, refers to the Ayeyawady River, which was previously known as Irrawaddy River, of Myanmar. Cast net fishing with Irrawaddy dolphins in the Ayeyawaddy River is a unique of Myanmar. Irrawaddy dolphins and dugongs have been protected by law since 1994. Myanmar is one of the signatory States to The Memorandum of Understanding on the Conservation and Management of Dugongs (*Dugong dugon*) and their Habitats throughout their Range. Accidental killing in fishing nets and stranding of marine mammals were happened. Systematic stranding response to a live or dead marine mammal cannot be done so far. Awareness raising, capacity building, research and conservation of marine mammals are still in need.

Keywords: marine mammals, Myanmar, Irrawaddy dolphin, dugong

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Oral-MM-21

Distribution of Irrawaddy Dolphin in Irrawaddy (Ayeyawady) River, Myanmar

Han Win

Department of Fisheries and Wildlife Conservation Society

Irrawaddy dolphin, *Orcaella brevirostris* is distributed along the coastal water, also inhabit in Irrawaddy (Ayeyawady) River in Myanmar. Wildlife Conservation Society (WCS) introduced study on Irrawaddy dolphin in Ayeyawady River, Irrawaddy dolphin research survey, using the visual survey method, along the river including data on population, threats, mercury contamination in fish and environmental factors, was conducted by the team of three Department and WCS in 2002. This survey showed that the dolphin groups inhabit only between Mandalay and Bhamaw river-segment, upper part of Ayeyawady River. Based on this survey result, Department of Fisheries in collaboration with WCS conduct yearly Irrawaddy dolphin research survey in this river segment. Among the survey results, we found that the number of 72 dolphin individuals in 2004 was highest population. 58 individuals of Irrawaddy dolphin were found in Feb, 2015 survey. Long gill net with big mesh size and electric fishing are directly threats to dolphin in Ayeyawady River. We hope that the Gold mining and habitat degradation are as the indirect threats. Southern part of this river segment, 74 km long, was established as the Irrawaddy dolphin Protected Area by the Department of Fisheries (DoF) in 2005, to conserve Critically Endangered population; under 20 individuals of this sub-river segment. Collaboration DoF and WCS patrol in the Protected Area twice a month, and conduct educational program and research activities for dolphin conservation.

Keywords: Irrawaddy Dolphin, Myanmar

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Oral-BS-22

Seasonal Change in Body Weight of Japanese Pipistrelle (*Pipistrellus abramus*) and Asian Parti-colored Bat (*Vespertilio sinensis*), in Relation with Hibernation

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Tama zoological park; *Inokashira park zoo

Body weights of insect-eating bats in the wild are known to change by season. Body weight also changes in captivity, not only in external environment, such as due to food availability, but internal environment are thought to influence the change in body weight too. Therefore, we aimed to investigate the seasonal change in body weight of insect-eating bats and its relation with hibernation, in captivity. In this study, we focused on Japanese pipistrelle (*Pipistrellus abramus*) and Asian parti-colored bat (*Vespertilio sinensis*) which lived and kept for more than a year in Tama zoological park. We recorded the body weight of two Japanese pipistrelle (1 male, 1 female) and two Asian parti-colored bat (1 male, 1 female), approximately once in two weeks. We also recorded the amount of food given, amount of food left, use of water bowl, and maximum and minimum temperature. All bats that showed a seasonal change in body weight were showing a maximum peak around October and November. In the wild, body weight showed two peaks, one in spring and one in autumn, for females. Pregnancy was thought to be the reason, but no bats were pregnant in this study, so this may be the reason for the difference. In addition, for both species, days that bats did not eat or use the water bowls increased in November to May, and they were hibernating. The days that the bats were hibernating change by year. When the bats were hibernating less, the body weight seemed to decrease, but because of small sample size, the relation was not significant. The influences of the days of hibernation in bats should be studied in the future.

Keywords: Japanese pipistrelle, Asian parti-colored bat, body weight, hibernation

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Genetic Diversity of Sex Chromosome in Captive Eastern Sarus Crane (*Grus antigone sharpii*) and Its Application for Sexing and Genetic Management.

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Listed as vulnerable, Sarus crane (*Grus antigone*) has been in a steady decline over the past decades due to landscape alteration for agriculture and socio-economic development. In Thailand, it was classified as the protected wild animal according to Thai Wildlife Preservation and Protection Act, B.E. 2535 (1992). Their population had been drastically declined across their range and extinct from the natural resource of Thailand for decades. However, conservation initiative has successfully designed and implemented effective captive breeding management with the goal of reintroduction. Advance in molecular biology and the analysis of genetic diversity of the crane founders will greatly enhance the reintroduction success. The sex chromosome was subjected for molecular genetic analysis in captive Sarus Cranes from Nakhon Ratchasima zoo, Khao Kheow open zoo and Bangpra water bird breeding station. Z chromosome study revealed eleven alleles of the founder males. Although the overall image illuminated high genetic diversity of the founder cranes, only five lines were retain high reproductive success. The genetic exchange between the zoo and captive breeding stations may be considered so that the crane founders would harbor the representative genetic diversity necessary for evolutionary adaptation. Therefore, the reproduction assessment was perspective step required for the *ex-situ* conservation. Moreover, according to the monomorphic characteristic, the sex identification from external morphology was indistinguishable. The molecular sex identification was also successfully applied by PCR-based method. This outcome was a valuable component for the breeding plan, captive management and selection individuals to contribute the balancing sex ratio of reintroduction.

Keywords: Captive Eastern Sarus Crane, Genetic Diversity, Sex Chromosome, Sexing

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Sequencing Analysis of Interferon gamma (IFN- γ) of Thai Cervidae and Preliminary Quantification of Rusa Deer's IFN- γ mRNA Expression by Real-time Reverse Transcriptase Polymerase Chain Reaction (RT-PCR)

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The study of cytokine properties is the one kind of methods that helps to assess the function of immune responses in animals. Interferon gamma (IFN- γ) is the pleiotropic cytokine, which plays an important role in the immune response to the intracellular pathogens (i.e. Tuberculosis), and widely used to clarify the cell-mediated immunity function. In this study, the completed IFN- γ cDNA sequences of Rusa deer (*Rusa timorensis*), and 3 species of Thai cervidae including Hog deer (*Axis porcinus*), Sambar deer

(*Rusa unicolor*) and Eld's deer (*Rucervus eldii thamin*) were identified. The open reading frame (ORF) of IFN- γ gene in all deer was 501 bp, which encoded the putative 166 amino acids. Alignment of nucleotide sequences of three species of Thai cervidae revealed the 99% homology with the Rusa deer. The quantification of IFN- γ mRNA expression was preliminary evaluated in Rusa deer by the real-time RT-PCR technique using EvaGreen® dye. The primers were designed base on the previous alignment profile of IFN- γ cDNA in cervidae. The result clearly shows that the quantitative RT-PCR can detect the differences in IFN- γ gene expression induced by mitogen stimulation. Thus, this study indicated the initiation step to develop the IFN- γ mRNA quantitation method by using the Rusa deer as a model for other Thai cervids. The further studies will be applied for development of disease detection for tuberculosis and BCG-vaccination monitoring in Rusa deer and also in Eld's deer, Hog deer and Sambar deer, which are the preserved wildlife species of Thailand.

Keywords: Cervidae, Interferon gamma, Quantification, Real-time RT-PCR

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Oral-BS-25

Effect of Capacitation Media on Post-thaw Rusa Deer (*Rusa timorensis*) Spermatozoa

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Capacitation is prerequisite critical for fertilization, because it is required for penetration of the zona pellucida. Hyperactivated motility is known to be a concomitant of capacitation and then the acrosome reaction. This study was designed to determine the effect of capacitation media on frozen-thawed rusa deer (*Rusa timorensis*) spermatozoa. Semen ejaculates from three rusa deer were collected by electroejaculation. The semen samples which had more than 80% motility were diluted and cryopreserved with Triladyl® extender with 10% final glycerol concentration. Frozen-thawed spermatozoa were divided and added with 4 media; TALP alone, TALP supplemented with bovine serum albumin (0.6% BSA), deer serum (20% DS) and polyvinyl alcohol (1% PVA). Post thaw sample without added media served as control. The frozen-thawed samples were kept at 37°C and subsequence assessed sperm quality and movement patterns (using computer-assisted sperm analysis; CASA), every 1h for 3h. Hyperactivation was defined as increasing of track speed, lateral amplitude, beat frequency and decreasing of progressive velocity. The results show that the media used in this study did not affected to motility, except TALP+1%PVA which was lower than control ($p<0.05$). The movement patterns of spermatozoa diluted in TALP+0.6%BSA and TALP+1%PVA were hyperactivated faster than control, TALP alone and TALP+20%DS (1h vs.2h). It indicates that TALP+0.6%BSA is a suitable media for activating rusa deer spermatozoa. Findings from this study will be useful as basic data for improving assisted reproductive technologies (ARTs) success in the future.

Keywords: capacitation, hyperactivation, Rusa deer

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The Threats and the Future of Myanmar elephants

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Approximately 16,000 elephants (*Elephas maximus*) are currently maintained in captivity in thirteen Asian countries for a variety of purposes: logging, tourism, cultural and religious activities, and transportation. The Union of Myanmar (formerly known as Burma) is the home to the world's largest captive Asian elephant population and one of the few countries that extensively used elephants in timber extraction. There are 5500+ elephants in captivity, half is owned by the state-run Myanmar Timber Enterprise (MTE) and the remaining half is privately owned according to the recent Myanmar Government data. Many of these privately-owned elephants are rented to MTE to work as logging elephants. The recent estimate of the total wild elephant population in Myanmar is about ~3,000. Poaching, shrinking and defragmentation of habitat along with physical disturbance to blocking the path of movements by developmental projects and road expansion are regarded as the major causes of declining of wild elephants of Myanmar. In April, 2014 the Myanmar Government imposed a ban on exporting raw teak and timber allowing only the export of high-end finished timber products. This ban reduced timber extraction by 50% and MTE stopped leasing privately-owned elephants for logging. The majority of these private-owned elephants are redundant and the owners are now facing the financial burden of keeping them in captivity. In order to meet these burdens, it is expected that these elephants will now be used in the tourist industry, as in the neighbouring country of Thailand. The unbalanced death and birth rate of MTE elephants is the primary obstacles to maintaining a viable elephant population in Myanmar. Other challenges of keeping captive elephants in Myanmar are illegal live elephant trade, lack of long term planning on capacity building of professional mahouts and elephant veterinarians, failure to protect or reserve elephant habitat and inadequate capacity, infrastructure and resources to develop sustainable and responsible elephant ecotourism. In collaboration with Myanmar professionals from MTE, a multi-disciplinary research group based at the University of Sheffield attempts to document how time in captivity influences the patterns of age-specific reproduction and survival among timber elephants. It is expected that these studies will provide a better understanding of elephant life history both in this population and more broadly will improve the survival strategies of Asian elephants in other range countries.

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The Genetic Structure of Domestic Asian Elephant across Thailand

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65 blood samples of domestic elephant were collected from private elephant camps across three regions of Thailand including Northern, Southern and North-Eastern part. Population genetic of domestic elephant was evaluated by microsatellite analysis with 12 chromosomal markers. Maternal lineage analysis was performed by amplification of mtDNA (partial CYTB and D-loop) and then sequencing. For microsatellite analysis, the average number of allele per locus is 8.917. The mean of expected heterozygosity is 0.7383. The mean polymorphic information content (PIC) is 0.7015. For maternal lineage analysis, 15 maternal haplotypes were found in this study and 8 of them were the novel mtDNA haplotype compared with previous report. The most common mtDNA haplotype is EmTHb06 (about 22%) and can be found in every region of Thailand. The haplotype and nucleotide diversity is 0.9096 and 0.0174, respectively. Moreover, network analysis revealed 2 clades of Thai elephant which showed pattern of mixed haplotype distribution between different regions, implied moving of elephant from one region to other regions. Most haplotype contained both gender in their group with 25% to 50% between female and male. However, some haplotypes contained only one gender especially in novel haplotypes. Since, mtDNA has transferred from mother to their offspring, haplotypes which contained only male in their groups (EmTHb18, 20, 22, 23, 25) supposed to be the end of that lineage. Thus, females which carried novel mtDNA haplotype are valuable sources of genetic diversity for captive breeding program.

Keywords: Asian elephant, mtDNA, haplotype

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Oral-ELE-28

Seasonal Incidence of Gastrointestinal Nematode Infestation in Myanmar Timber Elephants

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An investigation was undertaken to determine the gastrointestinal (GI) nematode infections in Myanmar timber elephants at Yezin, Ngaliike and Taungya regions during the period from June, 2012 to May, 2013 by coprological examination. A total of 60 fecal samples of elephants were collected from the study areas. All of the experimental elephants were not dewormed with anthelmintic drugs during the experimental period. In this study, incidence of GI nematode infections in relation to age, sex and season of the year were investigated. The data for incidence of GI nematode infections were statistically analyzed by Chi-square test and the number of EPG were compared among three seasons by analysis of variance. Out of 60 examined captive elephants from the three different camps for gastrointestinal nematodes infestation, 43 elephants (71.66%) were observed as positive during the study period. There were not significantly different ($p>0.05$) in GI nematode infestation among the three camps. However, GI nematode infections was significantly ($p<0.05$) higher in winter and rainy seasons (53.30%) than that of summer (45.00%) season. The incidence of GI parasites eggs infestation were not significantly ($p>0.05$) different between the females and males among the three seasons. The number of EPG was highest in rainy (111.78 ± 10.18) and followed by winter (78.50 ± 8.63) and the lowest in summer (67.50 ± 9.16). The number of EPG was significantly higher ($p<0.05$) in rainy than that of summer season. However, there was no significantly different ($p>0.05$) between rainy and winter and also summer and winter. The GI nematodes observed in the present study were *Strongyloid* and *Ampistomes* by identification based on fecal egg morphology. By fecal culture and identification based on lava morphology, *Quilonia spp.* was observed.

Keywords: Timber elephant, nematode, Strongyloid, Ampistomes, Ouilonia spp.

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Oral-ELE-29

The Coprological Survey of Endoparasites in Captive Asian Elephant in Kanchanaburi Province

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The coprological survey of the gastrointestinal parasites infection in Asian elephants (*Elephas maximus*) in Kanchanaburi province was performed. This present study were evaluated the association between host factors (age and sex) and endoparasitic infection and the efficacy of anthelmintic drug by comparing endoparasitic eggs density before and after deworming. One hundred and forty seven fresh faecal samples (86.98%) were collected from individual 169 captive Asian elephants (*Elephas maximus*) in 12 elephant camps located in Kanchanaburi province, during 14th to 17 th May 2015. Samples were examined for endoparasites by simple floatation, simple centrifugal sedimentation and formalin–ether sedimentation methods. The numbers of endoparasite eggs were counted by Modified McMaster technique. The comparison of endoparasitic density before and after deworming with anthelmintic drug (Febantel 3 mg/kg once daily PO) was done. The results revealed the total of 131 (89.1%) elephants were infected by endoparasites. Its divided to 94 single and 37 co-infections. Infectious rate in male was 3.89 fold in female and the highest infectious number was found in age group of <12 years (100%). Strongyle type egg, *Strongyloides spp.*, *Fasciola spp.* and *Anoplocephala spp.* were found. The highest number of infection were found in camp 7, 3 and 8 and their mean of parasitic load were 573.7, 229.4 and 443.8 epg., respectively. When comparing between pre and post deworming, parasitic load was significantly decreasing in only two camps. Further studies of anthelmintic drug resistant need to be done.

Keywords: elephant, parasites, deworming

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Oral-ELE-30

Emerging Parasitic and Infectious Diseases of Wild Asian Elephants (*Elephas maximus*) in Udawalawe National Park, Sri Lanka

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The Udawalawe National Park (UNP) is a protected area and occupies 308 km² in the southern ‘dry zone’ of Sri Lanka. UNP and adjacent elephant ranging areas are home to 600-800 wild elephants. An average of 12 elephant deaths per year are recorded in this ecosystem. This study reports the results of post-mortem examinations of 14 wild elephants conducted in 2014; deaths of five elephants were due to the parasite *Parabromina smithi* and one death was due to tuberculosis (TB) among them. The five elephant deaths associated with the parasite *P. smithi* are alarming. This parasite belongs to the Spiruridae

family and causes 0.4 – 08 cm caseous ulcers in the stomach wall. On gross necropsy, the margins of the ulcers were elevated and the *Parabromina* parasites could be observed in the ulcers as well as in adjacent mucosa of the stomach wall. The parasite was identified by morphology and PCR. The age range of affected animals was 2 to 35 years. This is the first identification of the parasite, *P. smithi* and its associated mortalities in wild elephants in Sri Lanka. The death due to TB is also a major concern. The elephant was a female of approximately 35 years old. There were typical tuberculosis granulomas affecting >60% of lung tissue. Histopathology, culture and isolation of an acid-fast organism, and PCR confirmed the causative organism as *Mycobacterium tuberculosis*. This is the first confirmed case of tuberculosis among wild Sri Lankan elephants in Sri Lanka. The emergence of parasitic and infectious diseases in wild Asian elephants could be due to chronic stress associated with human disturbances and the increasing density of elephants.

Keywords: Asian elephant, *E. maximus*, Human-elephant conflict, M. tuberculosis, Parabromoina

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Oral-ELE-31

Treatment of Multiple Limb Chronic Lameness in a Geriatric Asian elephant (*E. maximus*) in a Traditional Setting, a 2 Years Road Map

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This paper describes the treatment plan, progress and outcome of the treatment of severe chronic lameness in a street elephant in Cambodia. The medical requirements and the realities of traditional animal management and ownership were merged into a long haul treatment plan that served as road map to recovery.

Keywords: Asian elephant, pododermatitis, arthritis,

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Oral-ELE-32

The Study of Fecal Cortisol Metabolites between Wild, Trekking and Non-Trekking Elephants in Kanchanaburi Province, Thailand

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Fecal cortisol metabolites have been used to assess stress status in Asian elephant. In this present study, the fecal cortisol metabolites concentrations in wild, trekking and non-trekking elephants (*Elephas maximus*) in Kanchanaburi province were measured. Ten fecal elephants in each group were collected

during high (November 2014 - January 2015) and low season (May 2015 – July 2015). Moreover, seven wild elephant fecal samples were collected in May. The samples were sent to laboratory for hormone extraction. Fecal concentration of cortisol metabolites was determined by enzyme immunoassay (EIA) method. Mean of fecal cortisol metabolites concentration of the wild elephants (8.99 ± 1.05 ng/g) was lower than non-trekking elephant (17.56 ± 0.59 ng/g) and trekking elephants (23.10 ± 0.78 ng/g) ($p < 0.001$). The significant difference of cortisol metabolites between three groups might reveal the higher stress in trekking elephant. The result of this study might be fulfilled in the elephant management for improving better welfare in the future.

Keywords: Asian elephant, cortisol hormone, feces

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Oral-ELE-33

Measurement of Cortisol Levels in Pregnant Asian Elephant (*Elephas maximus*) Patcharapa Towiboon^{1,2}, Kanokporn Saenphet³, Sittidet Mahasawangkul⁴, Janine L. Brown⁵, Weeraya Thongkum⁶, Chatchai Tayapiwatana⁶, Chatchote Thitaram⁷

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The problem of the declines of Asian elephant populations, some way to solve this problem is to encourage pregnancy in captive elephants. Normally, the gestation period of elephant is between 20-22 months. In some cases, we can find abortion in pregnant elephants. It can be caused by inappropriate management and high stress level. This study was to monitor the stress status in pregnant elephants by using cortisol hormone. Blood samples were collected from four pregnant elephants. Progesterone and cortisol concentrations were measured to diagnose pregnancy and to monitor stress level respectively by enzyme immunoassay. For monitoring, gestation was divided into five periods; 0-16 weeks, 17-32 weeks, 33-48 weeks, 49-64 weeks and 65-90 weeks. The results showed no significant difference between cortisol concentrations during these five gestation period ($p > 0.05$) and no positive correlation with progesterone concentration.

Keywords: Asian elephant (*Elephas maximus*), pregnancy, cortisol

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Oral-ELE-34

Characterization of Aerobic Microbial Flora from Wounds and Eye Discharges in a group of Captive Sri Lankan Elephants (*Elephas maximus maximus*)

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Wound infections and excessive eye discharges are common issues among captive Sri Lankan elephants, which may lead to lameness and severe eye infections respectively. Further, development of antimicrobial resistance (AMR) is a major concern with these infections. Objective was to identify the aerobic bacteria in wounds and eye discharges in a group of elephants in Elephant Orphanage,

Pinnawela, Sri Lanka and to determine the AMR patterns. Samples from 12 elephants were cultured on blood agar and incubated at 37°C for 24 hours and isolates were identified using conventional biochemistry. Antimicrobial susceptibility test was performed using Kirby-Bauer disk diffusion method for ampicillin, Augmentin, sulpha-trimethoprim (cotrimoxazole), gentamicin and enrofloxacin, the commonly used antimicrobials to treat these conditions. The Gram negative rods isolated from wounds included *Klebsiella*, *Proteus* and *Yersinia spp* and 30% were resistant to Ampicillin and Augmentin while the rest were susceptible for all antimicrobials. Gram negative rods from eye discharges included *Klebsiella spp.*, *E.coli* and *Yersinia*; all of which were resistant or had intermediate susceptibility to ampicillin and 80% of isolates were resistant or had intermediate susceptibility to Augmentin. All the isolates were susceptible for cotrimoxazole, gentamicin and enrofloxacin. The Gram positive cocci isolated from wounds included *Staphylococcus saprophyticus*, *S. epidermidis*, *S. pseudointermedius* and few uncharacterized *Staphylococcus spp*. Out of them 83% were resistant or had intermediate susceptibility to ampicillin while 33% were resistant or had intermediate susceptibility to Augmentin. The Gram positive cocci isolated from eye discharges were *Staphylococcus epidermidis*, *S. hominis*, *S. arlettae*, *S. sciuri* and few uncharacterized organisms. Out of them 50% were resistant to ampicillin while 25% were resistant to Augmentin. Further, 25% of them had intermediate resistance for enrofloxacin. All the isolates were susceptible for cotrimoxazole and gentamicin.

Keywords: Sri Lankan Elephants, *Elephas maximus maximus*, Wound infections, eye discharges, antimicrobial resistance

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Oral-ELE-35

Antimicrobial Resistance Patterns of Enterobacteria from Two Captive Sri Lankan Elephant (*Elephas maximus maximus*) Populations

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Sri Lanka has the highest Asian elephant density in the world. The National Zoological Gardens maintains the largest captive population (85 elephants, new born - 70 years old) at Elephant Orphanage, Pinnawela (EOP) while Department of Wildlife Conservation maintains approximately 50 (semi-captive) orphan elephants (1 day old - 6 years old) with minimal human contact and intermittent access to wild at Elephant Transit Home (ETH), Udawalawe. Periodically the 6 year old elephants are released back to the wild. Compared to human and livestock pathogens, little is known about antimicrobial resistance (AMR) patterns in wildlife populations, particularly elephants. Since many calves are injured or sick at presentation, ETH uses more antimicrobials than EOP. Therefore the objective was to compare AMR patterns in enterobacterial isolates (good indicators for AMR) from captive elephants in EOP and semi captive elephants in ETH. Fecal samples were collected from 23 elephants at EOP and 27 elephants at ETH and cultured on XLD agar. Two isolates from each sample were identified by conventional biochemical methods. Antimicrobial susceptibility test was performed using Kirby-Bauer disk diffusion method for ampicillin, Augmentin, ceftriaxone, cotrimoxazole and enrofloxacin, the commonly used antimicrobials on these elephants. Majority (62%) of the 50 isolates from EOP were *Escherichia coli* while the rest were *Klebsiella spp.* (34%) and *Proteus spp.* (4%). All isolates were resistant to ampicillin and susceptible to ceftriaxone, cotrimoxazole and enrofloxacin. Five (10%) were resistant to Augmentin. Similarly, majority (77.5%) of the 40 isolates from ETH were *E.coli* while the rest (22.5%) was *Klebsiella spp.* Interestingly only 20 isolates (50%) were resistant to ampicillin, while 27.5%, 10%,

7.5%, 5% were resistant for Augmentin, cotrimoxazole, ceftriaxone and enrofloxacin respectively, suggesting the increase in AMR coincides with antimicrobial usage in elephant populations.

Keywords: Sri Lankan Elephant, *Elephas maximus maximus*, antimicrobial resistance,

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Oral-CM-36

Experimental Study of Ivermectin Toxicity in Red Eared Slider Turtle

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Ivermectin is a broad spectrum antiparasitic widely used in veterinary medicine. Its administration in chelonians is avoided due to the toxicity reported by the study of Teare and Bush in 1983. The aims of this study are: (i) determine the correlation between doses and mortality ;(ii) determine the acute toxicity of ivermectine; and (iii) find the toxic component in a commercial ivermectin formula (Ivomec Ovin injectable 1%®, Merial, Lyon, France) in Red-eared slider turtle.

Keywords: Ivermectine, terrapins, toxicity.

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Oral-CM-37

Preliminary Study on Oral Microflora of Spectacle Cobra (*Naja naja*), Hump-nosed Viper (*Hypnale spp.*) and Russell's viper (*Daboia russelli*) in a Captive Population from Sri Lanka

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The Spectacle cobra (*Naja naja*), the Russell's viper (*Daboia russelli*), and the Hump-nosed vipers (3 species, *Hypnale hypnale*, *H. nepa* and *H. zara*) are the most common snakes causing envenomation in humans and domestic animals in Sri Lanka. These bite wounds may lead to local and systemic infections, which may even be fatal irrespective of envenomation. Bacteria from such infections most commonly originate from the oral microflora of the biting snake. Therefore this study was performed to identify the oral bacterial flora of spectacle cobra, Russell's viper and hump-nosed viper in a captive population in Sri Lanka. Forty one aerobic bacterial isolates were recovered on blood agar from 5 spectacle cobras, 5 hump-nosed vipers, and 2 Russell's vipers. Eight isolates were *Staphylococcus* species, while 6 *Bacillus* species, 5 *Citrobacter* species, 3 *Salmonella* species, 3 *Proteus vulgaris* isolates, 3 *Proteus mirabilis* isolates, 3 *Klebsiella* species, 2 *Streptococcus* species, 2 *Micrococcus* species, 2 *Pseudomonas aeruginosa* isolates, and single isolates each of *Serratia* species, *Pasteurella haemolytica*, *Escherichia coli* and one unclassified isolate were recovered. Further, spectacle cobra and humped nose vipers had higher species diversity of bacteria (9 species each) compared to Russell's vipers which had only 4 species of bacteria. *Staphylococcus* spp. was the most prevalent bacteria followed by *Salmonella* spp., *Citrobacter* spp., and *Bacillus* spp. while *E. coli* had the lowest prevalence. Out of these organisms, *Staphylococcus* spp., *Salmonella* spp., *Proteus mirabilis*, *Proteus vulgaris*, *Klebsiella* spp., *Pseudomonas aeruginosa*, *E. coli* and *Pasteurella haemolytica* are potential human and animal

pathogens. Further studies to isolate and identify bacteria from snakebite wounds in humans and animals will be beneficial to determine the relationship between the oral microfloras of snakes and wound infections and thereby select the suitable antibacterials to treat the infections.

Keywords: Spectacle cobra, *Naja naja*, Russell's viper, *Daboia russelli*, and the Hump-nosed viper, *Hypnale hypnale*, *Hypnale nepa*, *Hypnale zara*, oral microflora

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Oral-CM-38

Antimicrobial Resistance of Enterobacterial Isolate from Toque Macaque (*Macaca sinica opisthomi*) in Peradenia University Premises, Sri Lanka

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More than 300 individuals of Toque macaque sub species, *Macaca sinica opisthomi* belongs to nine different troops have been recorded in the Peradeniya University premises which live close contact with humans. Increased interactions between human and monkeys may increase the risk of zoonoses. This study was carried to evaluate the antibiotic susceptibility of enteric bacteria from these troops. Twenty two swabs were obtained from different troops of free living macaques. The swabs were inoculated in to MacConkey agar and selected isolates were identified using phenotypic characters and standard biochemical tests (Gram stain, urease, citrate, and TSI and Indole production). Twenty seven isolates were recovered and majority were *E.coli* (63%; 17/27) followed by *Klebsiella spp.* (29%; 8/27), *Pseudomonas spp.* and *Proteus spp.* (4%; 1/27). Antimicrobial susceptibility test (AMST) was performed by disk diffusion method for amoxicillin, amoxicillin+clavulanate, ceftazidime, doxycycline, and ciprofloxacin. All isolates were resistant or intermediately susceptible for amoxicillin, and no isolate was resistant for ceftazidime, 9 isolates were resistant for amoxicillin+ clavulanate and doxycycline and 2 isolates were resistant for ciprofloxacin. All isolates were susceptible for ceftazidime. More than 45% of isolates were resistant to at least two of the antibiotics used in the study. The results indicate the development of AMR against commonly used antimicrobials in human and veterinary medicine in enterobacteria from a toque macaque population living in close contact with human.

Keywords: Toque macaque (*Macaca sinica opisthomi*), enteric bacteria, antimicrobial susceptibility test (AMST)

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Oral-CM-39

Seroprevalence Survey of Hepatitis B and Vaccine Effectiveness Study in Non-Human Primates

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Hepatitis B is an important disease in public health that can infect non-human primates. This study aimed to survey the seroprevalence of Hepatitis B in non-human primates (n=113) under the care of the Zoological Park Organization. A total of 93 gibbons, 8 chimpanzees and 12 orangutans were tested by commercial ELISA assay for hepatitis B surface antigen (HBsAg), hepatitis B core antibody (anti-HBc) and hepatitis B surface antibody (anti-HBs). The seroprevalence of hepatitis B virus infection was 16.13% in the gibbons. No infected chimpanzees and orangutans were found. The immuned gibbons, chimpanzees and orangutans were 20.43%, 12.50% and 33.33%, respectively. 44.09% of the gibbons, 75.00% of the chimpanzees and 50.00% of the orangutans were susceptible to the disease. The unidentified status of hepatitis B in the gibbons, chimpanzees and orangutans were 19.35%, 12.50% and 16.67%, respectively. All of the infected gibbons were infected with gibbon hepatitis B virus (GiHBV). There was no difference in the biochemistry values of the hepatic enzymes including aspartate aminotransferase (AST), alanine aminotransferase (ALT) and alkaline phosphatase (ALP) in the infected, immuned and susceptible animal of each species. Hepatitis B vaccination program (Hepavax-Gene®TF inj) was provided to all susceptible animals. The hepatitis B vaccine can induce immune response in vaccinated animals.

Keywords: Hepatitis B, Non-human primate, Hepatitis B vaccine

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Oral-CM-40

Case Report: Enucleation and Bullet Extraction from the Base of Cavum Orbita of *Macaca fascicularis* in Kalaweit Gibbon Conservation Center and Sanctuary

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KALAWAIT Gibbon Conservation Center and Sanctuary

A male juvenile *Macaca fascicularis* was rescued on 9th January 2015. Two bullet wounds were found on the body: on the left cheek and the right shoulder just at the distal scapula. From the X-ray image, it was confirmed that one bullet was lying on the base of the left cavum orbita and the other one was located on the edge of infraspinous fossa near the vertebral border of the scapula. The first bullet wound on the left cheek was penetrating deep into the border of cavum orbita that the left eye was pushed outside (possibly due to a forceful pushed as when the bullet hit the head) and the dorsal part of this organ was partially protruding. Due to the distance from where the animal was rescued and the sanctuary, the tissue of the eyeball had become severely damage that it was in no way could be preserved (reposition). This condition ironically gave an easy access into the bullet nest and made the extraction possible. Enucleasi bulbi was performed on the left eye but because the lack of tissue, the closing of the skin around the eyes into the hole of cavum orbita left a dead space inside the cavum but has undergone a proper tissue remodeling and healed. The animal lost its contra lateral vision which made it completely blind. A possible reason for this blindness was damage on optical nerve due to prolong retraction of the nerve by protruding of the injured eyes before the surgery.

Keywords: *Macaca fascicularis*, Bullet extraction, Enucleation

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Oral-CM-41

A Review of 4 Pyometra Cases in Aged Captive Wild Felids at Dusit Zoo, Thailand

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Disease of reproductive system is one of the important problems causing female infertility, illness and death. The incidence of pathological female reproductive organs has been reported in many aged females. Pyometra is a common disease of intact (un-neutered) female dogs and cats. However, it has been reported in captive wild felids. Four cases of pyometra were diagnosed in large wild felids in our collection over five years including Bengal tiger (n=2, age 8 and 10 year old), a lioness (age 8 year old) and a leopard (age 13 year old). Clinical signs include anorexia, lethargy, and purulent vulvar discharge. Diagnosis was based on clinical signs, hematology & biochemistry profile, radiography, and abdominal ultrasonography. The lion has been treated using systematic antibiotic and anti-inflammatory therapy for open-cervix pyometra. However, the clinical signs recurred after 2 months of treatment with closed-cervix pyometra. Therefore, an ovariohysterectomy (OVH) was performed in all cases. The uterus of all animals revealed a thickened endometrium with purulent and sanguinous fluid. The bacterial culture resulted in *Enterobacter spp.* and *Klebsiella spp.* (in 2 Bengal tigers) and *Escherichia coli* (in lion and leopard). All animals had an excellent recovery after OVH and systemic antibiotic therapy. Interestingly, all cases occurred in singleton females that never have bred or became pregnant. The retrospective reviews, close observation and regular physical examination with emphasis on reproductive organs on aging females of felids species is recommended.

Keywords: Pyometra, captive wild felids, aged

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Oral-CM-42

Inflammatory Bowel Disease in a Clouded Leopard (*Neofelis nebulosa*)

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Inflammatory bowel disease is a commonly diagnosed infiltrative gastrointestinal disease in domesticated house cats; however, cases are seldom been diagnosed and reported in captive endangered exotic cats. A 15-year old female clouded leopard at Taipei Zoo began to show waxing and waning vomiting and chronic weight loss in July, 2013. In the following 16 months, a 33% weight loss (from 16kg to 10.6kg) was observed. Initial laboratory findings showed normocytic non-regenerative anemia, and no significant changes on abdominal ultrasound and computed tomography. Further diagnostic work-up performed on March 24th, 2015 revealed thickening of the small intestines, and hypo-echoic pancreas on abdominal ultrasound. Gastro-intestinal biopsy obtained via endoscopy showed changes consistent with feline inflammatory bowel disease. Therapeutic management for inflammatory bowel disease including oral prednisolone, subcutaneous cobalamin injections, and intra-muscular iron dextran injections were instituted to which the clouded leopard responded well with evidence of weight gain and resolution of the anemia.

Keywords: clouded leopard, inflammatory bowel disease

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Oral-CM-43

Diagnostic Laparoscopy for Leopard Cat (*Prionailurus bengalensis*) with Intercostal Abdominal Hernia and Hepatic Lipidosis

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Intercostal abdominal hernia in the 11th intercostal space was identified in a leopard cat. Although mild leukopenia was found in laboratory examinations, no remarkable abnormality was revealed in medical imaging. To investigate abdominal organs, diagnostic laparoscopy was performed after hernia repair. In laparoscopic view, the closure of herniation site and whitish discoloration lesion in the liver (left medial lobe) were observed. Then, laparoscopic liver biopsy was performed against the affected hepatic tissue. Histologically, the sample was diagnosed as mild hepatic lipidosis. This is the first trial of diagnostic laparoscopy and laparoscopic liver biopsy in the leopard cat patient.

Keywords: Leopard cat, Intercostal abdominal hernia, Diagnostic laparoscopy, Laparoscopic liver biopsy, Hepatic lipidosis

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Oral-CM-44

3D Printed Prosthetic Slipper for helping a Duck Rehabilitating from Left Tarsometatarsus Fracture

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The patient (Quack-Quack) was an adult free-living duck in the campus of National Taiwan University (NTU). In May 2014, he was sent to the NTU Veterinary Hospital due to severe left leg fracture by dog attacking. After bone repairing surgery, the repositioned tibiotarsus presented inward twisting, as a result, he was unable to stand or walk with left foot but tibiotarsus joint. During this period, he was installed with Robert-Jones bandage and hand-made slipper, which was made and tied with EVA sponge and NexcareTM Coban, respectively. The fixation of the foot and digital position was invalid. With technical assistance in 3D scanning/printing and 3D design from Taipei Hackerspace and LUNG X LUNG Design, a fit and stable prosthetic slipper was made. The 3D model was established by scanning paper clay mold and modified using Rhinoceros 5 3D software. In order to prevent developing bumblefoot, soft and elastic material, NinjaFlex filament, was used as the printing material. Fixation of the slipper to the foot had been designed with three fixed holes for the digits and a strong but flexible simple lock mechanism on the tarsometatarsus. Quack-Quack was able to walk by both feet using this prosthesis.

Keywords: 3d print, 3d design, prosthetic, wildlife, avian, duck, fracture

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Oral-CM-45

Immobilization and Anesthesia of Free-ranging Formosan Black Bear (*Ursus thibetanus formosanus*) with Dexmedetomidine-tiletamine-zolazepam Combination - How veterinaries help endangered species conservation in remote mountains

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The Formosan black bears (*Ursus thibetanus formosanus*) are the largest endemic carnivore in Taiwan, distributed in the Central Mountain Range of the island and are threatened by habitat loss and poaching. During November 2014 to February 2015, five free-ranging Formosan black bear were caught with Aldrich spring-activated foot snares and were immobilized using a blowpipe dart with dexmedetomidine (DM)-tiletamine-zolazepam (TZ) for radiotracking and morphometric measurements and were reversed with atipamezole thereafter. During the anesthesia blood sample, body tissue and ectoparasites were collected for genetics and conservation medicine researches. The dosage of the agents we used were 0.02-0.06 mg/kg dexmedetomidine (Dexdomitor®, Pfizer, New York, NY), 2-6 mg/kg tiletamine-zolazepam (Zoletil®, Virbac, Carros, France) and atipamizole (Antisedan®, Orion, Espoo, Finland) using a volume equivalent to that of the previously administered dexmedetomidine. During the anesthesia, hypoxemia, sudden recovery and prolonged recovery were noted. Wild rare animal study are extremely difficult especially in remote virgin forest or mountains like Central Mountain Range in Taiwan. With these cases we want to share the experience using DMTZ combination in free-ranging wild black bear, furthermore we want to propose a frame work about dealing with wild endangered carnivore in the first line, bring the maximum effect of wildlife veterinaries to conservation of endangered animals.

Keywords: Black bear, anesthesia, immobilization, dexmedetomidine, tiletamine, zolazepam, conservation medicine

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Oral-PP-46

Molecular Epidemiological and Pathological Studies of Rabies in Ferret Badgers in Taiwan

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Taiwan had been considered as a rabies-free region for more than 50 years. In 2013, rabies in Taiwan ferret badger (TWFB; *Melogale moschata subaurantiaca*) was discovered through the wildlife disease surveillance. Phylogeographic analyses demonstrated that the rabies virus (RABV) affecting TWFBs is a distinct lineage from Chinese rabies virus strains. The most recent common ancestor of the RABV originated 91-113 years ago, suggesting that the RABV could be cryptically circulating in Taiwan. Since the rabies outbreak, 496 of 1,266 submitted TWFBs (39.2%) were rabies-positive, tested by direct fluorescent antibody test. Histopathological findings of the TWFB rabies include none-to-moderate nonsuppurative meningoencephalomyelitis, characterized by lymphoplasmacytic meningitis and

perivascular cuffs associated with neurodegeneration and presence of pathogenomic Negri bodies. Viral antigens most prominently presented in the brainstem. Phylogenetic analysis of nucleoprotein gene of the RABVs revealed that the viruses can be divided into two clusters: cluster 1 (TW-CS; central and southern Taiwan) and cluster 2 (TW-E; eastern Taiwan). This geographical segregation may be affected by the Central Mountain Range and Lao-Nong River, where separates Taiwan Island longitudinally.

Keywords: rabies, Taiwan ferret badger, pathology, molecular epidemiology

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Oral-PP-47

Ovarian Tumor in Malayan Sun Bear (*Helarctos malyanus*): A Case Report

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Ovarian tumor is a neoplasm that can be seen in both human and animals. In domestic animal, a number of cases were reported mainly in ovarian epithelial cell tumor. In this report, a twelve-year-old female Malayan sun bear (*Helarctos malyanus*) died with no clinical signs. A complete post mortem examination was conducted. The abdomen was dilated and filled with exudate. The remarkable lesions of various sizes were seen including round masses in abdominal cavity with attachment to the peritoneum, omentum and hepatic surface. Ovary were bilaterally enlarged with whitish masses of multiple sizes. Histopathology showed the epithelial tumor cells arranging in papillary and tubular patterns. The tumor cells were not invaded into parenchyma of visceral organs and there was no evidence of lung metastases. In addition, immunohistochemistry of ovarian tissue was performed using antibodies against pan-cytokeratin, cytokeratin-7 and Hecter Battifora mesothelial epitope-1 (HBME-1) proteins, the marker for ovarian surface epithelium and derivative tumor. In conclusion, the final diagnosis is papillary adenocarcinoma of subsurface epithelial structure. This information will be valuable for the assessment of future cases of ovarian tumor in Asian bear species.

Keywords: papillary adenocarcinoma, ovary, HBME-1, CK-7

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Oral-PP-48

Pulmonary/Air Sac Carcinoma in a White-bellied Sea Eagle (*Haliaeetus leucogaster*)

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A 34-year-old white-bellied sea eagle (*Haliaeetus leucogaster*) had poor appetite and activity for a long time without improvement after medication. During necropsy, a large, infiltrative, soft to myxoid mass was seen at the right caudal lung lobe, and was found involving the posterior thoracic air sac, dorsal thoracic cavity, the lumbosacral bone, and the right kidney. On microscopic examination, the mass was

poorly circumscribed and expanding towards the aforementioned organs. It consisted of sheets or lobules of neoplastic cells that occasionally arranged into a tubulo-papillary pattern and were admixed with an eosinophilic, collagenous stroma. The neoplastic cells were supported by fibrous membrane, presenting plump, cuboidal shape with distinct cell borders and had moderate amount of lightly stained or clear cytoplasm. Some of the neoplastic cells had the prominent cilia on cell surface. Nuclei were round, large, and ovoid, having variably conspicuous nucleoli with coarse or condensed chromatin. High degree of anisocytosis, anisokaryosis with frequent karyomegaly were observed. Infrequently, areas of continuity between bronchiolar epithelium and the neoplastic tissue could be seen. Immunohistochemistry of the neoplasm showed positive signals of cytokeratin and TTF-1, providing evidence that the tumor cells were epithelial, and pulmonary or air sac in origin. Considering the mass location, and with the aid of special stains, the neoplasm was thus diagnosed as carcinoma with pulmonary or air sac origin. Primary respiratory neoplasms are uncommon and infrequently documented in pet or captive birds. To our knowledge, there is no published report of respiratory neoplasm in white-bellied sea eagles.

Keywords: Carcinoma, Pulmonary, Air Sac, White-bellied sea eagle, TTF-1

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Oral-PP-49

A Preliminary Study on Gastrointestinal Parasites of Three Species of Home Garden Rodents in Central Sri Lanka

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Gastrointestinal parasites of three species of common home garden rodents; Indian crested porcupine (*Hystrix indica*), Grizzled giant squirrel (*Ratufa macroura*) and Indian giant flying squirrel (*Petaurista philippensis*) reported to the Veterinary Teaching Hospital, Peradeniya, Sri Lanka from January 2014 to June 2015 were characterized. Faecal samples from live animals and faecal samples, gastric and intestinal contents from necropsy examinations were analyzed using simple flotation and modified Ziehl-Neelsen staining methods. Morphological identification was performed using light microscopy. Five porcupines were positive for helminth eggs (Trichuris, Strongyl, Strongyloid, Capillaria and Ascaroid), while only one of them was positive for cryptosporidium oocytes. Different species of nematodes were identified from the stomach and small intestinal contents of four porcupines. Some of them belonged to family Trichostrongylidae and subfamily Uncinariinae. Morphology of the family Trichostrongylidae nematodes is suggestive of *Heligomosmoides polygyrus*. Species of subfamily Uncinariinae could not be identified, as there was no genus under this subfamily morphologically similar to the hookworm found. A cestode species was reported from one porcupine. A heavy burden of helminth was observed in the small intestine of one old flying squirrel. The helminth was identified as a pinworm of family Oxyuridae. A cestode species was recovered from the small intestine of a giant squirrel. Neither helminth parasites from the porcupines nor rodent pinworms carry a zoonotic potential. Further studies on species identification, pathogenicity and zoonotic potential are important as they directly connect with the health and conservation of this free living rodent species.

Keywords: Indian crested porcupine, *Hystrix indica*, Grizzled giant squirrel, *Ratufa macroura*, Gastrointestinal parasites

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Case report: Diversity of *Theileria spp.* of domestic cattle and wild Bovidae in Thailand

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Theileria spp. is one of the most common blood parasites found in Bovidae worldwide. Wild Bovidae are well-known carriers of this parasite. In Thailand, theileriosis is commonly found in domestic and free-grazing cattle, however, few reports of theileria infection in wild Bovidae were reported in Thailand. In this study, we sequenced 18s rRNA of positive blood samples to theileria-specific primers. One sequences of *Theileria spp.* found in gaur (*Bos gaurus*) from Khao Kheow Open Zoo and two sequences of domestic cattle from Thung Tako district, southern Thailand, were analysis and constructed the phylogenetic tree. For the phylogenetic analysis, the sequence of *Theileria spp.* found in gaur was clustered with *T. orientalis*, *T. buffeii* and *T. sergenti* which reported in cattle from various countries. Surprisingly, this sequence showed 100% identity with *T. orientalis* isolated from cattle in China. This can be implied that 18s rRNA is quite conserved among *T. orientalis* due to the large different on geography. To verify the origin of infection, more sample collection should be performed on other Bovidae that fed nearby gaur exhibition. In addition, two sequences obtained from domestic cattle from southern Thailand were clustered with *T. sinensis* and clearly separate from other *Theileria spp.* *T. sinensis* was identified as a new species of *Theileria spp.* due to their unique genetic characterization (28s, 18s, D2-D3 segments) and showed distant clade from other *Theileria spp.* on phylogenetic tree as well as our results.

Keywords: Theileria, 18s, Bovidae

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Opportunity for Publishing Wildlife Science Papers on Journal of Veterinary Medical Science (JVMS)

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JVMS was established in 1885 and is currently publishing a substantial number of papers regarding all categories of veterinary medicine including anatomy, pathology and clinical sciences as a monthly open access journal listed in SCI (IF:0.782, 2014). In addition to these categories, wild life science was a new section, started in July, 2013. In each issue, an average of 2 papers regarding wildlife science in all aspects have been published. The countries contributing to this publication are Japan and Korea, and papers from US and Germany have also appeared. As far as we know, there is no SCI listed Asian journals which properly review papers on wildlife medicine. The development of zoo and wildlife medicine in Asia strongly depends on publication in internationally recognized scientific journals. Submission of papers to JVMS, especially those presented in the annual ASCM meeting, is strongly encouraged and ASCM should support their submission through academic/technical advice and financial support.

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Poster-1

Culture isolation of *Anaplasma phagocytophilum* from black-striped field mice (*Apodemus agrarius*)

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Human granulocytic anaplasmosis, an emerging infectious disease in the Republic of Korea (ROK), is caused by an obligate intracellular tick-borne bacterium of the family Anaplasmataceae. *Anaplasma phagocytophilum* has been found in a variety of animal species including wild deer, cats, dogs, gray squirrels, horses, and mice. The objective of the present study was to isolate and characterize the strains of *A. phagocytophilum* in black-striped field mice (*Apodemus agrarius*) in the ROK. *Anaplasma* infection based on the 16S rRNA genes were detected by conventional polymerase chain reaction (PCR) and species-specific nested PCR assays with DNA from Korean water deer (KWD) blood and black-striped field mice (BSFM) spleen. For isolation of *A. phagocytophilum*, BALB/c mice were used for propagation. White blood cells from 4-5 infected BALB/c mice were inoculated into 3×10^4 HL60 and THP-1 cell line, respectively. Eight KWD and 27 BSFM were captured. Seven (87.5%) blood samples of KWD and 12 (44.4%) spleens of BSFM were positive for *A. phagocytophilum* according to PCR. However, 7 white blood cell samples of KWD were not propagated in HL60 and THP-1 cell line. Twelve spleen suspensions of BSFM were pooled for inoculum, and 0.3 ml of spleen suspension was intraperitoneally inoculated into 20 BALB/c mice (5 in each group; total 4 groups). When tested for 10

days post-inoculation, inoculated mice were positive for *A. phagocytophilum* by PCR. Three of 4 groups were not propagated and 1 of 4 groups was propagated in THP-1 cell line. *A. phagocytophilum* was observed in Wright-Giemsa stain preparations at 9 days after inoculation of cell cultures. Morulae were found on 70% of THP-1 cells at 12 days post-inoculation. Cultured *A. phagocytophilum* were confirmed by indirect immunofluorescence assay. PCR was performed using 16S rRNA, *ankA*, *groEL*, and *msp2* gene primers were used to amplify the genes of *A. phagocytophilum*. All of the nucleotide sequences from cultured isolate were identical with *A. phagocytophilum*. We isolated the strain of *A. phagocytophilum* (AAIK isolate) in black-striped field mice (*Apodemus agrarius*) in the ROK. This strain may be expected to contribute to public health and veterinary medicine.

Keywords: *Anaplasma phagocytophilum*, *A. bovis*, black-striped field mice, tick

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Poster-CM-2

Cardiorespiratory Dose-response Relationship of Isoflurane in Cinereous Vulture (*Aegypius monachus*) during Spontaneous Ventilation

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The Cinereous vulture (*Aegypius monachus*) is one of the rarest species of raptors in the world. Globally endangered Cinereous vultures regularly migrate to South Korea for the winter, and they have been frequently rescued for various casualties. Inhalation anesthesia with oxygen has been used in the wildlife center and isoflurane is a most commonly used inhalant anesthetic agent in avian medicine. The purpose of this study was to investigate the dose-response cardiorespiratory effects of isoflurane during spontaneous ventilation in cinereous vultures. Ten clinically healthy cinereous vultures were anesthetized with isoflurane. After instrumentation, each bird was held initially 1.0, 1.5, 2.0, 2.5, 3.0 and then 1.0% of end-tidal isoflurane concentration for an equilibration period of 15 min in the given order. Immediately after equilibration period, the cardiorespiratory effects of isoflurane were investigated at each concentration of end-tidal isoflurane. When the end-tidal isoflurane concentration was increased, there was significant dose-dependent increase in heart rate and end tidal CO₂ partial pressure. And there was significant dose-dependent decrease in arterial blood pressure. However, the mean respiratory rate did not change significantly with different isoflurane concentrations. Isoflurane for anesthesia of spontaneously breathing cinereous vultures is a suitable choice for diagnostic or surgical procedures. However, careful controls of anesthetic dose and ventilation conditions are recommended in this species.

Keywords: *Aegypius monachus*, Cinereous vulture, Anesthesia, Isoflurane, Cardiorespiratory

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Poster-CM-3

Geotrichosis in a Prairie Dog

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A case of geotrichosis in a black tailed prairie dog is reported. Animal was presented debilitated, emaciated, dehydrated and generalized alopecia. Skin scrapes and hair pluck culture revealed yeast-like fungal infection, which was then identified as *Geotrichum candidum*. After stabilization, animal was started with antifungal therapy, including oral Griseofulvin 12.5mg, topical Tolnaftate and Enilconazole

bath. The therapy was continued for 30 days. Hair sample was negative for fungal infection on day 31. Animal recovered with good body condition and good haircoat.

Keywords: Geotrichosis, Prairie Dog

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Poster-CM-4

Cervical Carcinoma in a Male Black-Tail Prairie Dog (*Cynomys ludovicianus*)

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Spontaneous neoplasms of salivary glands in rodents are relatively infrequent. A four year-old male black-tail prairie dog developed a rapidly enlarged, irregular, movable mass in the cervical region. The swollen mass showed poor response to antibiotic treatment. Fine needle aspiration revealed polyhedral to spindle cells with intracytoplasmic vacuoles and prominent nucleoli. Surgical excision of the cervical mass was performed on 8th May, 2015 and the mass was found encircled by a capsule and infiltrated extensively to the parotid region. Biopsies were also performed on surrounding lymph nodes. Histopathological examination of the removed mass revealed a carcinoma which most likely originated from the parotid salivary gland and lymphatic tumor emboli was suspected. Microscopically, the tumor showed malignancy through mild to moderate pleomorphism and atypical mitoses with some evidence of stromal invasion. No migration phenomenon was found in the lymph nodes. The animal recovered rapidly after surgery, and the clinical signs of the mass had not recurred until 5 months following surgery.

Keywords: Black-Tail Prairie Dog, Cervical Carcinoma

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Poster-CM-5

Endoscopic Removal of Gizzard Metal Foreign Bodies in a Laying Hen

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A one-year old laying hen was referred to the Veterinary Medical Center of Chungbuk National University with the history of foreign body ingestion. From the radiographic examination, there were about 10 of metal materials found in the gizzard. Additional test was not proceed but endoscopy was decided to remove the metallic foreign bodies. The chicken was anesthetized with isoflurane and then intubated with a 3.5 mm uncuffed endotracheal tube. Endoscopy confirmed that the metallic materials in the gizzard were screws. By using endoscopic snare, the screws were carefully removed one by one. Total of 10 screws were removed from the gizzard. Post endoscopy operation care for the laying hen were by maintaining it on only soft food intake and activity restriction for one week. Good recovery was observed after a week.

Keywords: Endoscopy, Laying Hens, Foreign body

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Poster-CM-6

Fennec Fox (*Vulpes zerda*) with Hematometra associated with Endometrial Hyperplasia

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A five-year-old fennec fox in Cheong-ju zoo was presented for abdominal distension, swelling of mammary glands and hematuria. On ultrasonographic examination, hyperechoic materials were observed in enlarged uterine cavity. Ovariohystrectomy was done to solve the problems of reproductive system. A blood-clot like materials was observed in the uterus. Cytological evaluation showed numerous erythrocytes, a few leukocytes and bilirubin crystals in uterine fluids. The patient progesterone concentration of blood was 7.3 ng/ml. It is higher than anestrus and lower than true pregnant condition in fennec fox. A histopathological examination confirmed a zonary placenta in the uterus. Hematometra is uncommon disease in canine. There are many reasons of hematometra like uterine trauma, anticoagulant rodenticide toxicity and other acquired coagulation deficiencies, neoplasia, placental necrosis and postpartum endometritis. Postpartum subinvolution of placental sites is also one of the reasons. This case was an early stage abortion with hematometra in a fennec fox.

Keywords: Fennec fox, uterine endometrial hyperplasia, pseudo-pregnancy

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Poster-CM-7

Infectious Pododermatitis in the Captive Asiatic Black Bears (*Ursus thibetanus*)

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The Asiatic black bear is classified as vulnerable species on IUCN Red list and belongs to CITES appendix I. It is classified as class I endangered animal by Korea Ministry of Environment and restoration project has been conducted since 2004. This case report describes necrotic pododermatitis of four bears in Asiatic black bear restoration center in Korea. Initially, affected bears showed lameness and swelling on hindlimb and proceeded to severe inflammation and necrosis eventually. Four bacterial species, *Escherichia coli*, *Proteus mirabilis*, *Enterococcus faecalis*, and *Pseudomonas aeruginosa* were identified. Antibiotics were administrated according to the result of antimicrobial susceptibility test. Gentamicin and clindamycin were administrated following the first susceptibility test but treatment was not successful. After second susceptibility test, imipenem and azithromycin were administrated and inflammation and necrosis ceased. Isolated bacteria were considered as contaminated bacteria or opportunistic infectious agents. Primary cause of pododermatitis in these patients is uncertain but it may have attributed to high temperature and humidity and secondary infection may have aggravated inflammation and necrosis of affected skin lesion.

Keywords: Asiatic black bear, pododermatitis, bacteria

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Poster-AP-8

Genetic Sex Determination and Polymorphism Analysis of CHD Gene in Gaviiformes

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Sex determination is very important in studies and researches on evolution, reproduction ecology and diseases of avian. Since avian sex determination based on morphological traits is difficult, genetic methods are widely used as simple and robust tools. This study was conducted to determine sex and analyze polymorphism in Gaviiformes using *CHD* (Chromo-Helicase-DNA) binding gene. Blood samples were collected from 22 Gaviiformes (3 species) in Jeju island. To determine sex, DNA fragment inside *CHD* gene was amplified by PCR. The PCR products were sequenced and analyzed polymorphism. Of the 22 samples, female ratio was 2/3 (67%) in *Gavia stellata*, 10/13 (80%) in *Gavia pacifica* and 4/6 (75%) in *Gavia arctica*. The results of homology analysis of *CHD-Z* gene was 97% between *Gavia stellata* and *Gavia pacifica*, 98% between *Gavia pacifica* and *Gavia arctica* and 99% between *Gavia stellata* and *Gavia pacifica*. The results of *CHD-W* gene were all 98%. In this study, it was possible to establish genetic sex determination method and suggest species discrimination tool using *CHD* gene in Gaviiformes.

Keywords: sex determination, polymorphism, CHD gene, Gaviiformes

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Poster-AP-9

External Physical Measurement for Goral (*Neamorphedus caudatus*)

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Goral (*Neamorphedus caudatus*) is designated as a natural monument number 217 by South Korea Cultural Heritage Administration and as an endangered species I by South Korea Ministry of Environment and Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). The species was commonly found in high mountains in 1950s; however, it is reported that there are about only 800 individuals in South Korea. This study will show the differences in age and sex; moreover, it will present useful data in goral breeding and health care by presenting the statistics of external body size of the gorals. The target of this study were 19 gorals (4 male, 9 adult female, and 6 premature female) reared in Korean Goral Restoration Center. For the accuracy and safety measurement, gorals were kept in quiet place and Xylazine 0.1mg / kg were given by intramuscular injection in order to stabilize. External body measurements were divided into 15 different categories. The result showed that skull length 21.31±1.65cm, head width 12.46±1.27cm, ear height 14.27±1.20cm, horn length 15.92±2.37cm, neck circumference 32.85±3.69cm, withers height 69.08±14.04cm, body length 53.23±8.25cm, chest length 26.69±9.18cm, abdomen length 24.23±10.69cm, tail length 17.00±1.84cm, hoof length of foreleg 5.00±0.65cm, hoof length of hind leg 4.92±0.81cm, ankle circumference of foreleg 9.35±0.66cm, ankle circumference of hind leg 9.35±0.59cm, and the weight 37.00±3.79kg. There were differences between males and females. Female gorals were averagely bigger than male gorals. As gorals are endangered species, it is important to treat and release the rescued gorals. This study will help to estimate body condition when wild gorals are rescued and will be useful data in determination of rearing and management; moreover, it will contribute to increasing of the population of gorals.

Keywords: Physical measurement, goral, wildlife, *Neamorphedus caudatus*

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Poster-AP-10

Sexual Dimorphism in Eurasian Otter (*Lutra lutra*) of South Korea by Craniodental Study with Geometric Morphometrics

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Variation of craniodental morphology of the Eurasian otter in South Korea was studied with geometric morphometrics to identify sexual dimorphism. A morphological study in regional population helps for basic data establishment which will support any other study in different aspect to eventually be able to predict the behaviour, adaptation and evolution of this carnivore species more precisely. Thus, the direction for conserving this species from going extinct will have better resolutions. 33 adult skulls (17 male and 16 female) were used. Images of the dorsal and ventral view of the skull and right lateral of mandible were taken and then digitized by using tpsdig2 with only right side of them taken into measure. Analysis was done with tpsRelw and PAST software. Results showed some of the RW1 and RW2 revealed significance with $p < 0.05$ in shape variation to differentiate male and female; however, they were also significantly correlated with the size of skull. Size difference between male and female skulls was also found highly significant. Bivariate plots did not separate male and female skulls in distinct but did showed the tendency of pooling of same sex samples at same side of the graph. All the results were consistent showing that shape variation of skull in Eurasian otter is related with the skull size. Skull size difference between male and female were significant that until a point of assumption could be made that most likely bigger size of the skull might indicated sex of male.

Presenter: Alice Lau Ching Ching

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Poster-AP-11

Hematological and Biochemical Analysis of Rescued Goral (*Naemorhedus caudatus*) and Captive Goral

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Hematological and biochemical profile for Korean goral is not fully defined. Moreover, there is no record about the clinical research on goral rescued from natural disaster in Korea. This study aimed to identify hematological and biochemical mean values for captive and rescued goral. Blood samples were collected from 5 rescued gorals and 23 captive gorals. Whole blood were analysed for hematology and serum were used for biochemical profile analysis. Mean corpuscular hemoglobin (MCH), platelet, mean plasma volume (MPV), albumin, mean corpuscular hemoglobin concentration (MCHC), glutamic oxaloacetic transaminase (GOT), alkaline phosphatase (ALP), creatine, calcium, glucose and amylase values were higher in rescued group. White blood cell (WBC), hematocrit, red blood cell (RBC), hemoglobin, mean corpuscular volume (MCV), total protein (TP), glutamic pyruvic transaminase (GPT), total bilirubin (TBIL), blood urea nitrogen (BUN), inorganic phosphorus (IP) and cholesterol (CHOL) values were smaller in rescued group. The results of this study demonstrated hematological and biochemical values for both rescued and captive gorals. The results also revealed the significant variations of some parameters between two groups of gorals.

Keywords: Goral, *Naemorhedus caudatus*, Hematology, Biochemical analysis

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Poster-AP-12

**Haematology and Biochemistry Parameters of Confiscated Sunda pangolins
(*Manis javanica*) in Thailand**

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The Sunda pangolins (*Manis javanica*) are one of the most exploited and confiscated species in Southeast Asia. They are heavily hunted for food and traditional Chinese medicine and the population is in rapid decline. Confiscated pangolins are generally found in very poor conditions due to prolonged periods without food or water in stressful, unhygienic environments and need medical attention before they can be released back into the wild. However, little information regarding the ecology and health management of pangolins is available and no information on the haematology and biochemistry of Sunda pangolins has been previously reported. This study was conducted at the Centre of Rehabilitation and Quarantine of Confiscated Animals, Wildlife and Alien Species, Mahidol University during July to August, 2014. Blood samples were collected from 39 (24, 15) confiscated Sunda pangolins on the first day of arrival (first collection) and when they were classified as clinically healthy (second collection). Blood results from the second collection were used to establish haematology and biochemistry reference intervals. Results were also compared between the first and second collection and between males and females. Females had significantly higher neutrophil, MCH and MCHC and significantly lower lymphocyte when compared to males. The mean WBC, neutrophil, RBC, MCV, Platelet and Hb in the first collection were significantly higher than the means of the second collection. This study presents the first haematological and biochemistry analysis of clinically healthy Sunda pangolins which would aid in the health assessment, disease investigation and welfare improvement of confiscated pangolins.

Keywords: Sunda pangolin, *Manis javanica*, haematology, biochemistry, reference intervals

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Poster-AP-13

**Hematology and Blood Biochemistry Reference Values for Captured Wild
Kestrels (*Falco tinnunculus interstinctus*)**

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The kestrel (*Falco tinnunculus interstinctus*) is a nocturnal bird of prey, distributed worldwide except tundra area. Kestrel is designated as a Korean natural monument number 323. The number of the sick or wounded individuals brought to wildlife center is increasing every year. This study will report hematologic and blood biochemistry values for clinical use in kestrels. It will also be useful for understanding the physiology of kestrels and providing high quality medical care for wild and captive individuals. We used a total of 18 kestrels from Kangwon National University Wildlife Medical Rescue Center. All 18 birds are less than 6 month old and are considered clinically healthy based on normal behavior, appetite and body weight. Blood samples were collected from cutaneous ulnar (wing or brachial) or cervical vein and used for laboratory analysis. Statistical analysis was performed with the statistical software SAS with significance of $P < 0.05$. In this study, 10 hematologic and 17 of blood biochemical parameters of wild kestrels were examined. Most of hematologic and blood biochemical reference intervals obtained from this study were within or close to the reference ranges published previously for kestrels. However, all kestrels included in this study were younger than 6 months and bred in wildlife rescue center; thus, further study with older individuals are necessary for suggesting reference values of kestrels. Furthermore, larger sample size with additional hematologic and

biochemical parameters and environmental variables are recommended to increase the reliability of the study.

Keywords: *Falco tinnunculus interstinctus*, blood biochemistry, kestrels, hematology.

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Poster-AP-14

Establishment of Reference Intervals of Hematologic and Serum Biochemical Values in the Oriental White Stork *Ciconia boyciana*

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The objective of this study was to establish accurate baseline values of clinical laboratory data with regard to age-related changes in Oriental White Stork (*Ciconia boyciana*). A total of 94 clinically normal storks, including 64 youngsters (<1-year old; 30 male and 34 female) and 30 adults (>1-year old; 17 male and 13 female), were included. Hematological assays were performed using manual method and serum biochemistry profiles were examined using an automated analyzer. There were no significant differences in any parameters between the male and female storks, while 15 parameters were significantly different between the young and adult ones. Of these 15 parameters, total protein, albumin, alanine aminotransferase, creatinine, triglyceride, total bilirubin, phosphorus, and WBC count; hemoglobin levels; packed cell volume; and mean cell volume were higher in the adult storks than in the young ones, who showed higher glucose, uric acid, and alkaline phosphatase levels, a higher albumin/globulin ratio, and a higher sodium/potassium ratio. Data pertaining to hematological and serum biochemistry profiles of the Oriental White Stork can aid researchers who work for the conservation and rehabilitation of this endangered species.

Keywords: age, *Ciconia boyciana*, hematology, Oriental White Stork, reference interval, serum biochemistry

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Poster-ELE-15

Recent Findings of the Myanmar Timber Elephant Research Project

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Myanmar is home to the second largest Asian elephant population worldwide and a key reservoir for this endangered species. Myanmar possesses the largest population of captive elephants in the world (5000); over 50% are owned by the state-run Timber Enterprise. Elephants are vital to Myanmar's identity, culture, economy, and ecology. Low rates of survival and reproduction of captive elephants necessitate the capture of wild elephants to supplement the captive population. The long-term sustainability of the captive population is therefore of utmost important for the maintenance of the wild population, which is the second largest, after India. Myanmar is the only country in the South-east Asia where elephants are extensively used in an ecologically-friendly method of timber extraction. Additionally, Myanmar maintains a century-old registration system in which each individual elephant has a unique number, name, and a log book describing the details of its pedigree and life history from the day they are born or captured until death. We have developed a multi-generational studbook database using digitalized log-book data and end-of-year extraction reports. To date, biodata of 10,000 individuals that were born/captured from 1920 to the present has been compiled. This database is the

most comprehensive and detailed record of demographic data available for any captive elephant population in the world. In collaboration with Myanmar professionals from the Myanmar Timber Enterprise and the University of Veterinary Science, a multi-disciplinary research group based at the University of Sheffield attempts to document how time in captivity influences survival probabilities and reproductive potential in captive elephants. Utilizing the studbook data, we are exploring (1) factors affecting calf mortality (2) patterns of age-specific reproduction and survival among timber elephants and (3) the effect of climate on patterns of mortality and births. It is expected that these studies will provide a better understanding of elephant life history both in this population and more broadly in terms of the life history strategies of long-lived mammals.

Keywords: Asian elephant, *Elephas maximus*, Timber elephant, Myanmar

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Poster-ELE-16

Occurrence of Parasitic Infestations in Myanmar Timber Elephants

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World's largest semi-captive Asian elephant population ($n \approx 4000$) is employed in timber industry of Myanmar. The climatic and variable ecological conditions of Myanmar are favourable for the growth, multiplication and transmissions of parasites which cause significant health problems in timber elephants where they can act as disease carriers to wild counterparts sharing the same foraging grounds. Between September, 2012 and December, 2014, a total of 548 (males=234 males; females=324 females; age range =5 yr to 50 yr) fecal samples of timber elephants from Nay Pyi Taw and Taungoo timber extraction agencies were sent to the Department of Pharmacology and Parasitology, University of Veterinary Science for the presence of parasitic infestation. Sedimentation method was used to determine the parasite egg count per gram of stool. A Pearson's chi-square test was used to test a correlation between occurrence of parasites (eggs per gram) and age, sex and months of collection using SPSS for windows. Amphistome and Strongyles were the most common parasites with the prevalence of 34.85% (191/548) and 27.91% (153/548), respectively. The highest prevalence was found in August and September. Age and sex were found no relationship with parasitic infestations.

Keywords: Parasitic infestation, Myanmar timber elephant, Amphistome, Strongyle

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Poster-ELE-17

***Clostridium perfringens* type A Infection in an Asian Elephant (*Elephas maximus*): A Case Report**

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A 40-year-old, male domestic Asian elephant in the elephant camp, Chiang Mai, Thailand presented watery diarrhea and signs of colic. The veterinarian provided him supportive treatments and rehydration. However, the symptoms remained stable and unresponsive to the treatment. Then, the elephant died within three days after the initial signs were observed. Macroscopically, the animal showed multifocal hemorrhagic and necrotic lesions distributed in the gastrointestinal tract, liver, kidney, heart and lung. Ulceration and rupture of the mucosal ileum surrounded by necrotic areas was also noticed. Microscopically, the submitted samples from the internal organs revealed severe necrosis, hemorrhage and inflammation associated with multifocal bacterial clumps in the villi of ileum. Molecular diagnosis by polymerase chain reaction revealed positivity for the toxin gene of *Clostridium perfringens* type A from the spleen and intestinal content. The result was consistent with the presence of gram-positive rods bacteria of the impression smears from intestinal mucosa. In this case, toxemia due to *Clostridium perfringens* infection and peritonitis caused by rupture of the small intestine was suggested to be the cause of death. The predisposing causes might be the ingestion of food contaminated with soil and the rapid environmental changes. Feeding with an appropriate diet, providing good sanitation and reducing stressors may be important to prevent the disease in domestic elephant.

Keywords: *Clostridium perfringens*, Toxemia, Asian elephant, *Elephas maximus*

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Poster-INF-18

Molecular Epidemiology of Rabies Viruses in Taiwan, 2013-2015

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Taiwan has been considered a rabies-free country since 1961. However, three Formosan ferret-badgers (*Melogale moschata subaurantiaca*) found in Nantou County and Yunlin County were diagnosed as rabies by direct fluorescent antibody test (FAT), reverse transcription polymerase chain reaction (RT-PCR), and immunohistochemistry (IHC) in July, 2013. After the first three cases, a massive surveillance on wild carnivores was carried out. From July 1, 2013 to July 31, 2015, 5,460 animal brain tissues were submitted to three rabies diagnosis laboratories in Taiwan and 503 cases were tested rabies-positive by the FAT. The positive rates of rabies were 39.18% (496/1,266) in Formosan ferret-badger, 1.72% (5/290) in Formosan gem-faced civet (*Paguma larvata taivana*), 0.57% (1/174) in house shrew (*Suncus murinus*), and 0.03% (1/3,061) in dog. Results of the surveillance showed that in Taiwan, the disease is still restricted in wild Formosan ferret-badgers. The nucleoprotein gene based phylogenetic analysis showed that the rabies viruses isolated from Formosan ferret-badgers were clearly divided into two groups, namely the Central and Southern group (TW-CS), covering the regions of Nantou, Taichung, Yunlin, Chiayi, Tainan, and Kaohsiung and the Eastern group (TW-E), covering the regions of Hualien, Taitung, and Pingtung. The nucleotide identities of nucleoprotein genes between TW-E subgroups and TW-CS subgroups ranged from 91.4 to 93.5%. Our study revealed that the ferret-badger-associated rabies virus in Taiwan has already evolved into two distinct strains.

Keywords: rabies, ferret-badger, molecular epidemiology

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Poster-INF-19

Raccoon Dogs Rabies Monitoring in South Korea

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Rabies is classified as a class 2 livestock infectious disease in South Korea and as a reportable disease by the World Organization for Animal Health (OIE). Raccoon dogs are responsible for transmitting rabies in South Korea since 1993. As analysis of species outbreak determined that it mainly infected in cows, dogs, and raccoon dogs, it is thus important to control rabies in wild raccoon dogs. Since 2001, the bait vaccine strategy for wild raccoon dogs has been the main method and the rabies outbreaks in livestock and raccoon dogs have been decreasing. However, it is still necessary to monitor rabies in wild animals to eradicate rabies in South Korea. We conducted rabies monitoring with Korean 25 raccoon dogs rescued from Gangwon province in 2015. In total, 25 brain samples of raccoon dogs were examined with fluorescent assay test (FAT) and RT-PCR. The FAT was performed according to the procedure described by the OIE and World Health Organization (WHO). Positive and negative controls were run together with the test samples. RT-PCR was carried out to detect RABV genomic sequences using RT-PCR kit containing specific primer sets that amplify the N gene of RABV. There were no positive reactions against rabies in two detective methods. In this study, wild raccoon dogs tested in Gangwon province were cleared from rabies infection which indicates that distribution of rabies bait vaccine may lead to eradication of rabies. There are several studies about monitoring rabies by serology testing; however, it is important to use brain sample for antigen detection. According to Animal and Plant Quarantine Agency, the antibody positive rate of rabies in Gangwon province was higher than Seoul and Gyeonggi in 2010 and 2011, so it is important to monitor rabies outbreak in Gangwon province. Continuous monitoring of rabies infection in raccoon dogs will help to eradicate the virus in domestic and wild animals, human beings, and moreover will contribute to veterinary public health.

Keywords: Rabies, Raccoon dogs, RT-PCR, Fluorescent Assay Test, monitoring

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Poster-INF-20

Infectious Disease Monitoring of Wild Mammals in Gangwon Province

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Wild animals are known to be susceptible to many diseases. Among those diseases, some may cause detrimental effect to the animal itself which might lead to significant reduction in population; furthermore with the possibility of zoonosis. This study conducted infectious disease monitoring on Tuberculosis, Brucellosis, Q-fever, Aujeszky's disease, Foot and Mouth Disease (FMD), Canine Distemper (CD), Bovine Viral Diarrhea (BVD), Bovine Rotavirus (BRV) and Bovine Coronavirus (BCoV) in 3 species of wild mammals (Water deer, Roe deer and Raccoon). Wild mammals of these three species were collected from August 2014 to June 2015 in Gangwon province. Total of 169 samples (Water deer 97, Roe deer 10, Raccoon 62) were examined. Tissue samples (Lymph node, spleen and intestine) were used for antigen detecting test for Tuberculosis, Brucellosis, Q-fever, CD, BVD, BRV and BCoV. Serums were used for Rose-Bengal test, kit test and ELISA to check the antibody of Tuberculosis, Brucellosis, Q-fever, Aujeszky's disease and FMD. The results of antigen detecting test in 66 water deer and 47 Raccoon dog were all negative and the result of antibody detecting test in 69 water deer, 10 Roe deer and 24 Raccoon dog were also negative, except for Q-fever that revealed positive or false-positive results in 4 water deer. Countries that have conducted diseases surveillance of their wild animal populations and know about their epizootiology are therefore better prepared in their preventive measurements. Constant monitoring of the disease status and conducting wildlife health evaluations, not only helps to minimise the economic loss caused by diseases; moreover, the

pathological or microbiological data collected from individual animal that make up a population will give a view about the host-agent relationship within a given population and environment.

Keywords: Infectious disease, zoonosis, wild animal, PCR, ELISA, monitoring

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Poster-INF-21

Surveillance Study of Wild Birds for West Nile Virus in Gangwon Province

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The rapid global expansion of West Nile virus (WNV) has recently raised concerns regarding its possible spread into South Korea. It means that surveillance study about WNV infection and preparation strategy are needed. This study tests blood, plasma and tissue samples from 222 wild birds representing 54 species rescued by Gangwon Wild Animal Rescue Center. Antigen and antibody detection test were conducted. The antigen detection tests included RT-PCR and Real-Time PCR by using tissue and blood samples. Sera were also evaluated by IgG ELISA and Virus Neutralization test (VNT). Two kidney samples were tested positive by RT-PCR and were re-examined by Real-Time PCR which then revealed negative for WNV. 12 Sera were also tested positive by IgG ELISA and were re-examined by VNT for both WNV and Japanese encephalitis virus (JEV). Out of the 12 sera, all samples were tested negative for WNV-specific antibodies; while only one sample was tested positive for JEV-specific antibodies. Therefore, these 11 samples were interpreted as having *flavivirus* exposure. Although our study revealed negative results on WNV, rapidly thriving international trade and equine industrial in South Korea nowadays, at the same time with the wild bird migration route that has shifted along with the climate changed are the reason why we concerned possibility of entry of WNV. Increasing in the cooperation between government and local agencies, such as wild animal rescue center will be an important factor in both the early detection of the disease and the development of effective veterinary and public health strategies.

Keywords: West Nile virus, Wild birds, South Korea, RT-PCR, ELISA, Virus Neutralization test

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Poster-INF-22

Severe Fever with Thrombocytopenia Syndrome Virus in the Wildlife of Korea

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Severe fever with thrombocytopenia syndrome (SFTS) is caused by SFTS virus (SFTSV), a novel bunyavirus reported to be endemic to central-northeastern China, southern Japan, and the Republic of Korea (ROK). To investigate SFTSV infections, we collected serum samples and ticks from wild

animals. Using serum samples and ticks, SFTSV-specific genes were amplified by one-step reverse transcription (RT)-PCR and nested PCR and sequenced. Indirect immunofluorescence assay (IFA) was performed to analyze virus-specific antibody levels in wild animals. Serum samples were collected from a total of 91 animals: 21 Korean water deer (KWD), 3 Siberian roe deer, 5 gorals, 7 raccoon dogs, 54 wild boars (WB), and 1 carrion crow. The SFTSV infection rate in wild animals was 3.30% (3 of 91 animals: 1 KWD and 2 WB). The seropositive rate was 5.56.59% (65 of 91 animals: 5 KWD and 1 WB). A total of 891 ticks were collected from 65 wild animals (9 species). Of the attached tick species, *Haemaphysalis longicornis* (74.86%) was the most abundant, followed by *H. flava* (20.20%) and *Ixodes nipponensis* (4.94%). The average minimum infection rate (MIR) of SFTSV in ticks was 4.98%. The MIRs of *H. longicornis*, *H. flava*, and *I. nipponensis* were 4.51%, 2.22%, and 22.73%, respectively. The MIRs of larvae, nymphs, and adult ticks were 0.68%, 6.88%, and 5.53%, respectively. Additionally, the MIRs of fed and unfed ticks were 4.67% and 4.96%, respectively. We detected a low SFTSV infection rate in wild animals, no differences in SFTSV infection rate with respect to bloodsucking in ticks, and SFTSV infection for all developmental stages of ticks. This study provides evidence that SFTSV may be passed on by transovarial transmission in ticks, and that ticks may act as the main reservoir of SFTSV. This is the first report describing the detection of SFTSV in wild animals in the ROK.

Keywords: Severe fever with thrombocytopenia syndrome virus, one-step RT-PCR, nested PCR, indirect immunofluorescence assay, ticks, wild animal

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Poster-INF-23

Avian Influenza Virus Surveillance of Wild Birds in Korea during Fall Migration Season

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Wild bird has been recognized as a source of infection in the outbreaks of highly pathogenic avian influenza in the domestic birds. Therefore nationwide surveillance has been constructed in the wild bird habitats collecting of fecal samples from September 2014 to April 2015. The detail results will be presented at the 8th international conference of ASCM in Myanmar.

Keywords: avian influenza, wild birds, surveillance

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Poster-INF-24

Canine Distemper in Free-Ranging Formosan Gem-Faced Civets in Taiwan

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After the rabid cases of Taiwan ferret badger (*Melogale moschata subaurantiaca*) were diagnosed, the rabies surveillance in Taiwan has been proceeded since July 2013. A large numbers of wild animals were submitted for the screen of rabies and canine distemper infection. Of the submitted 291 Taiwan ferret badgers and 77 Formosan gem-faced civets (*Paguma larvata taiwana*), 1 Taiwan ferret badger and 7 Formosan gem-faced civets were diagnosed as canine distemper by molecular methods. The canine distemper virus (CDV) infected Formosan gem-faced civets had neurological symptoms and no

significant gross lesions. Histopathologically, severe nonsuppurative demyelinating polioencephalomyelitis is present in the brain and spinal cord, accompanied with intracytoplasmic and intranuclear eosinophilic inclusion bodies. Immunohistochemically, CDV-specific antigens are found in the multinucleated giant cells, astrocytes and neurons. Negative IHC results are present in the gastrointestinal, respiratory, and urinary tissues. The prominent multinucleated giant cells in the necrotic lesions are characteristic in CDV-infected Formosan gem-faced civets, and are unusual in the brain of CDV-infected dogs. It is unclear whether the appearance of multinucleated giant cells is a host or viral strain specific phenomenon.

Keywords: canine distemper, Formosan gem-faced civets, pathology, immunohistochemistry

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Poster-PA-25

Ventricular Thrombosis Secondary to Salmonellosis in a Black-naped Hare (*Lepus nigricollis*)

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An adult, free ranging, female black-naped hare presented to the Veterinary Teaching Hospital in a moribund stage died soon after. A necropsy performed revealed ventricular thrombosis and pathological lesions in cardiovascular and other systems suggested septicemia. On gross examination, the heart was round in shape. The right ventricle was enlarged and occupied by a yellow-white, friable mass suggestive of a thrombus tightly adherent to the endocardium obscuring the valvular cusps, cordae tendinae and papillary muscles of the tricuspid valve. Histopathology revealed ventricular thrombosis and severe suppurative and valvular endocarditis. Severe multifocal, suppurative pneumonia with severe, diffuse tracheitis, multi-focal renal infarcts, moderate, multi-focal, hepatitis with mixed inflammatory cell infiltration and splenic white pulp hyperplasia were identified. Cystic endometrial hyperplasia was an incidental finding. Pure *Salmonella spp.* was isolated from heart blood culture. Antemortem hematology revealed leukocytosis (White-blood cell count – $42.50 \times 10^3/\mu\text{l}$), anaemia (Hct-13.8%) and thrombocytopenia (Platelet count- $92 \times 10^3/\mu\text{l}$). Gross and histopathological necropsy findings, microbiology, and hematological findings are all together suggestive of ventricular thrombosis secondary to sepsis. Salmonellosis is reported in several species of wild mammals including wild boar, roe deer, red deer, and European brown hare (*Lepus europaeus*). Cases with cardiovascular pathology are rarely reported in wildlife and to the best of our knowledge this is the first time that this condition is reported in a wild animal in Sri Lanka.

Keywords: Black-naped hare, *Lepus nigricollis*, *Salmonella spp.*, septicemia, suppurative pneumonia, ventricular thrombosis

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Poster-PA-26

Calcific Periarthritis in Binturong (*Arctictis binturong*): A Case Report

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Calcific periarthritis is a circumscribed juxta-articular deposit of minerals in human. Other literatures so called calcinosis universalis. There has no report of calcinosis universalis in animals. Multiple causes induced such lesions in human. Most common cause is due to chronic tissue inflammation. In this study, a 1.5-year-old, male, Binturong (*Arctictis binturong*) belonging to the animal presentation died after suffering from chronic inflammation of joints for 4 months. The radiographs showed multiple plaques and nodules around the joints of 4 limbs. Bacterial culture and identification was *Staphylococcus aureus*. The necropsy findings revealed multiple irregular hard calcified masses in the soft tissue and muscles around the joints of 4 limbs. In addition, there had caseous mass spreading through the shoulder and hip joints. Histopathology showed multiple abscesses and calcified granuloma that composed of caseous necrosis, mineral deposits surrounding by neutrophils and multinucleated giant cells in the soft tissue and muscles. Histochemical stains were done with Von Kossa, PAS and acid fast. The granuloma were positive only for Von Kossa stain. The presumptive cause of the lesions was suggested to be the bacteria inducing calcific periarthritis.

Keywords: calcinosis universalis, calcification, Staphylococcus, bearcat

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Poster-PA-27

Uterine Adenocarcinoma with Lung Metastasis in a Formosan Sika Deer (*Cervus nippon taiouanus*)

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A 21-year-old female Formosa sika deer died due to Rt. hindlimb fracture and subsequently deteriorated body condition. Postmortem examination revealed marked bilateral hydrometra due to lumen blockage by markedly but irregularly thickened uterine body wall along with several protruding, irregular, dark red firm nodules and multiple 0.1-2.0 cm, soft to firm nodules randomly distributed in the pulmonary parenchyma. Histopathological examination revealed an ill-delineated, non-encapsulated and infiltrative neoplasm in the uterine wall with severe inflammation, necrosis and hemorrhage. The tumor cells were in a tubular to branching papillary glandular arrangement; they were cuboidal to columnar and had polygonal nuclei with magenta nucleoli, infrequent mitosis, and intravascular tumor emboli. In the lungs, similar well-demarcated, partially encapsulated neoplastic glandular structures were multifocally present. Immunohistochemical staining revealed that the neoplastic glandular structures were strongly positive for cytokeratin and partially positive for vimentin; although the tumor cells were negative for TTF-1, HER-2, and ER, the invalid internal controls suggested possibly a poor antibody cross reactivity among animal species. A uterine adenocarcinoma with lung metastasis is diagnosed. Whether the current case is hormone-dependent or not requires further investigation.

Keywords: uterine adenocarcinoma, lung metastasis, Formosan Sika Deer

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Poster-PA-28

Cystic Thymoma in a Red Panda

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A 19-year-old, female, captive red panda (*Ailurus fulgens*) in Taipei zoo had respiratory distress and pleural effusion, and it was found dead despite the performance of thoracocentesis and medication. During necropsy, a well-circumscribed, multi-lobulated mediastinal mass was found within the cranial thorax and ventral to the lungs, measuring approximately 4.5 x 2 x 3 cm and showed soft texture with pink tinge. Cutting sections of the mass exhibited pale parenchyma with a mesh-like appearance composed of numerous small cystic spaces lined by pinkish framework. Histologically, the mass was well circumscribed and surrounded by thin fibrous capsule with some fat. It comprised sheets of mature small lymphocytes in the parenchyma and obscured the ribbons and trabeculae of the epithelial cells, which were epithelioid, oval to spindle, containing scant cytoplasm, ovoid and basophilic nuclei with marginated chromatin and inconspicuous nucleoli. Immunohistochemistry of the lymphocytes and the oval to spindle epithelial cells revealed prominent CD3 and pan-cytokeratin positivity, respectively, suggestive of T cell lymphocytes and epithelial origins. Besides, there were numerous, diffusely scattered cystic spaces with variable shapes and sizes among the neoplasm. Most of the cystic structures were cystic degeneration and coalescence of perivascular spaces that were devoid of epithelial lining, which could rule out multilocular thymic cyst, while the others were some dilated, large blood vessels lined by endothelium and showed positivity with factor VIII under immunohistochemistry. On the basis of the mass location and the histological findings, a thymoma with diffuse cystic degeneration and multifocal dilated blood vessels was diagnosed.

Keywords: thymoma, cystic degeneration, thymic cyst, red panda

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Poster-PA-29

Thymic Cyst with Spindle Cell Thymoma in a Barbary Sheep (*Ammotragus lervia*)

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A 20 years and 9 months old female Barbary sheep (*Ammotragus lervia*) had suffered from movement problem for a long period of time, became gradually emaciated and weak, and finally died. Grossly, an approximately 5 x 5 x 3 cm mass was found in the anterior portion of the thorax, which was attached to the ventral aspect of the right cranial lung lobe. The mass was a large unilocular cyst containing white, yellow to pink solid tissues with small cavities on cut sections. Microscopically, the cystic wall was composed of layers of fibrous connective tissue with an epithelial lining on the inner surface. The solid tissues were composed of spindle neoplastic cells arranged in an interwoven to storiform pattern with variable lymphocytic infiltration and multiple small but variably-sized cystic structures. The spindle neoplastic cells had a moderate amount of pale eosinophilic granular cytoplasm and oval to fusiform nucleus with inconspicuous nucleolus. Immunohistochemically, the proliferating cells were intensely positive for cytokeratin and partially positive for α -smooth muscle actin (α -SMA) and vimentin but negative for thyroid transcription factor-1 (TTF-1) and neuron-specific enolase (NSE), and most of the infiltrating lymphocytes were CD3-positive, suggestive of T lymphocytes. The intratumoral cysts contained periodic acid–Schiff (PAS)-negative proteinaceous secretion and were lined by flatten, cuboidal to columnar epithelial cells, which could be the cystically dilated medullary duct epithelium-derived structures. Based on the location and histopathological findings of the mass, formation of thymic cyst and spindle cell thymoma was diagnosed.

Keywords: Thymoma, thymic cyst, Barbary sheep

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Poster-PA-30

Study on Acute Gastroenteritis in Red Kangaroos

Than Naing Soe

Myanmar

Nay Pyi Taw Safari Park, the only one in Myanmar, has been displaying more than 250 animals of 19 species since 2011, being divided into three areas - the Asia, the Australia and the Africa. It covers about 298 acres. Starting with kangaroos and wallabies, one can enjoy a natural display of many wildlife species there. Most of them came from foreign origin but some are local species to Myanmar - eld's deer (*Cervus eldii*), hog deer (*Cervus porcines*), sambar (*Cervus unicolor*), mythun (*Bos frontalis*) and so on. Since the local species have a good adaptation and sound tolerance to the climate of central Myanmar, we have a few problems in managing them, but we still have many challenges in case of some exotic species. There have been many cases of diseases and even some cases of death. Among them, lumpy jaw, acute diarrhoea, gingivitis, bone fractures and accidental trauma and injuries are most common in kangaroos and wallabies, especially in wallabies. Fortunately, there is a sound working relationship between our team and the University of Veterinary Science and some other organizations. Though not every case, many cases were confirmed. It is the advantage of our cooperation. Recently the three red kangaroos in Safari Park, Nay Pyi Taw were killed by a sudden onset of bacterial infection. In this case, with the help of the Ni Ni Diagnostic Lab of Yangon, *Escherichia coli* and *Serratia fonticola* were isolated and identified from stool culture and *Klebsella pneumoniae* from lungs. In this study, I do emphasize the case; Acute Gastroenteritis in Red Kangaroos.

Presenter: Than Naing Soe

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Poster-PAR-32

Detection and Molecular Characterization of *Cryptosporidium* spp. among Wild Rodents and Insectivores in South Korea

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In order to examine the prevalence of *Cryptosporidium* infection in wild rodents and insectivores of South Korea and to assess their potential role as a source of human cryptosporidiosis, a total of 199 wild rodents and insectivore specimens were collected and screened for *Cryptosporidium* infection, from 10 regions of South Korea over the period of 2 years (2012-2013). A nested-PCR amplification of *Cryptosporidium* oocyst wall protein (COWP) gene fragment revealed an overall prevalence of 34.2% (68/199). The sequence analysis of 18S rRNA gene locus of *Cryptosporidium* was performed from those samples that tested positive by COWP amplification PCR. As a result, we identified 4 species/genotypes; chipmunk genotype I, cervine genotype I, *C. muris* and a new genotype which is closely related to bear genotype. The new genotype isolated from 12 *Apodemus agrarius* and 2 *Apodemus chejuensis* was not previously identified as known species or genotype, and therefore, it is supposed to be a novel genotype. In addition, the host spectrum of *Cryptosporidium* was extended to *A. agrarius* and *C. lasiura*, which had not been reported before. In this study, we found that the Korean wild rodents and insectivores were infected with various *Cryptosporidium* spp. with large intra-genotypic variation, indicating that they may function as potential reservoirs transmitting zoonotic *Cryptosporidium* to livestock and humans.

Keywords: cryptosporidium, rodents, insectivores, COWP, 18S rRNA, Korea

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Poster-PRI-33

Genetic Analysis in Slow Lorises (Genus *Nycticebus*) in Thailand

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Slow Lorises (Genus: *Nycticebus*) are small nocturnal primates inhabit Southeast Asia mainly. In present, IUCN classified “Genus: *Nycticebus*” into five species. This species is also listed as CITES appendix I since 2007 due to the decreasing of the population in wild. In Thailand, there are two species of Slow Lorises known which are *Nycticebus bengalensis* and *Nycticebus coucang*. There are also many rescued or confiscated Slow Lorises that are kept at breeding center of DNP (Department of National Parks, Wildlife and Plant Conservation) and ZPO (Zoological Park Organization of Thailand) for conservation purpose. In the past two years, we examined the specimens of the species kept at 12 facilities of DNP and ZPO by genetic analysis. All specimens were classified as *Nycticebus bengalensis* and *Nycticebus pygmaeus*. There were no specimens of *Nycticebus coucang* identified from the genetic analysis. Several specimens however resembled morphologically of the old subspecies of *Nycticebus coucang tenasserimensis*. In Thailand, there are morphologically two types of *bengalensis*. The specimens with darker face and fork mark are speculated as this type of *bengalensis*. Most of the specimens had no record of their origins. Differential comparison among habitat areas was very difficult. However, the specimens selected in this analysis were all with their origins and habitat areas well known. We compared the sequences of Control Region of D-loop and Mitochondrial DNA. Various sequences were confirmed among each habitation area.

Keywords: Slow Lorises (Genus *Nycticebus*), Genetic Analysis, *N. c. tenasserimensis*, Genetic diversity, Thailand

Presenter: Hiroko Somura

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Poster-PRI-33

Concentration of E1C, PdG, FSH in aged Captive Borneo Orangutans

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Hormone production is associated with aging. The most dramatic change around the age of 50 in women. Around the age of 50, the period during which sexual cycle ceases and the sex hormones diminish to almost none is called menopause (Guyton & Hall, 1991). Borneo Orangutans (*Pongo pygmaeus*) of Southeast Asia, Borneo are arboreal great ape. In Japan, population of captive orangutan decreased and aging of the population progresses year by year. However, there are no conclusive data to document reproductive senescence in orangutans. The present research deals with the measurement of sex steroid hormones and Follicle stimulating hormone, and makes it clear that change reproductive endocrine in aged orangutans. Three captive female orangutans, aged approximately 42 years, 47 years and approximately 57 years were used in this study. These animals were housed in Tama zoological park, Tokyo, Japan. We collected urinary samples from August 7, 2012 through September 28, 2012. We analyzed Estrone conjugates (E1C), Pregnanediol glucuronide (PdG) and Follicle stimulating hormone (FSH) using enzyme immunoassays. We analyzed Estrone conjugates (E1C), Pregnanediol glucuronide (PdG) and Follicle stimulating hormone (FSH) in urine by EIA. In approximately 57 years old female, E1C, PdG and FSH levels were not marked elevation. It is considered as one of reasons which ovarian activity might have been decline in approximately 57 years. In 47 years old female, E1C, PdG and FSH levels were marked elevated. It is assumed that ovulation occurred in 47 years old female. On the other hand, for sample collection period was short, we couldn't estimate the ovulation from hormonal dynamics in approximately 42 years old female. In comparison of three female orangutans, FSH levels were most high in the oldest of the study, approximately 57 years old female. In previous research of humans, the increase in FSH levels starts before final menstrual period (World Health Organization, Technical report, 1996). For this reason, it is considered that approximately 57 years old female

orangutan is beginning or over her menopause. These results suggest that these hormones are one of the biomarker of aging in orangutans.

Keywords: Orangutan, sex hormone,

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Poster-PRI-34

Case Report: Self-mutilation Tendency on Injured Gibbons

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Three injured gibbons that displayed self-mutilation behaviors:

Jaka (male, *Hylobates albibarbis*, 14 years). Injured middle finger, with deeply torn tissue from the base up until the tip of the finger with the bone partially shown and cut out tendon, which were reconstructed and stitched back to their place. After ten days the wound seemed to undergone a proper healing but the animal started to lick the finger and eventually the tip of the finger lost its tissue with only the third os phalang remained.

Dea (female, *Hylobates albibarbis*, 1 year). Sinister humerus fractured. Due to improper healing process (the previous owner didn't seek any veterinary help and just let it healed naturally) the hand can no longer function normally and the fingers being mutilated.

Leo (female, *Hylobates muelleri*). Fracture on 1/8 distal of radius sinister. Due to improper healing process the hand's tissue were rotten. The animal started to mutilate its hand before it was discovered and finally the hand was amputated.

The first two cases of the self-mutilation tendency were caused by loss of pain perception while on the last case it was caused by the dying tissue. It is postulated that those gibbons felt the needs to mutilate their body part which was no longer felt by them. Possibly this action is a natural act of adaptation in order to survive as a wildlife, as a body part which they can't feel its existence will probably just be a burden for them in the wild.

Keywords: Gibbon, Self- mutilation

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Poster-PRI-35

Case Report: Lymphoma/Leukemia in Four Non-human Primates

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Four non-human primates of two species from Taipei Zoo during period of 2012 to 2015, were confirmed with hematolymphoid malignancies by necropsy and following histopathological examination. The age of affected animals ranged from 12 to 17 years. Species affected were three *Cheirogaleus medius* (fat-tailed dwarf lemurs), and a *Nycticebus pygmaeus* (pygmy slow loris). These types of tumors have been reported in the literatures and are associated with retrovirus or herpes virus infections. Most of the cases in this study presented no significant clinical signs, but lethargy or anorexia. The tumors in all the cases showed multiple organs involvement, which included hematopoietic, integumentary, digestive, and pulmonary systems. Microscopic examination, the pleomorphic primitive tumor cells infiltrated within the parenchyma of the affected organs. Alopecic integumentary lesions showed epitheliotropic tumor cells with destructive behavior. All the tumor cells in these cases were intensively labeled for the anti-human CD3 antibody throughout the affected organs. Hence,

lymphomas/leukemias of T cell origin were confirmed. Besides, two fat-tailed dwarf lemurs were also found with metastatic carcinoma and adrenal cortical adenoma, respectively.

Keywords: Lymphoma, leukemia, primate, captive primates, hematopoietic tumors, immunohistochemistry

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Poster-PRI-36

Application of a Non-Invasive Oral Sampling Technique for Zoonotic Pathogen Surveillance in Nonhuman Primates in Cambodia, Lao PDR and Viet Nam

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Nonhuman primates are thought to be an important potential source of zoonotic pathogens due to their genetic and physiologic similarity with humans. In many parts of the world, including Southeast Asia, humans often come into close contact with nonhuman primates in and around human dwellings, through the wildlife trade, at zoos and sanctuaries or at locally and internationally visited cultural, religious and eco-tourism sites. These interactions between humans and nonhuman primates provide opportunities for pathogen spillover. A non-invasive oral sampling technique, involving the collection of discarded, masticated nylon swabs intentionally distributed to habituated or captive nonhuman primates, was applied in Cambodia, Lao PDR and Viet Nam. Over 100 individual nonhuman primates were sampled using this technique, and saliva samples were then harvested from the swabs and screened to identify known and novel viruses. Thirteen viral Family/Genus conventional PCR assays were applied to each sample, followed by cloning and sequencing for confirmation of results and virus identification. The work was carried out as part of the PREDICT project, an initiative designed to strengthen capacities in developing countries to detect, control, and prevent zoonotic viruses of pandemic potential. The successful application of this safe, practical and non-invasive technique for sampling nonhuman primates in Cambodia, Laos and Viet Nam demonstrates the feasibility of including nonhuman primates in zoonotic pathogen surveillance programs targeting high-risk interfaces for wildlife/human disease transmission.

Keywords: Primate, Infectious disease, Surveillance, Viral pathogen, Wildlife/human disease interface, Non-Invasive sampling, Zoonosis

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Measurement of cortisol levels in pregnant Asian elephant (*Elephas maximus*)

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Abstract. Asian elephant numbers in captive facilities are declining, so breeding is important. The normal gestation period is 20-22 months. Abortions occur and can be caused by inappropriate management and high stress. This study was conducted to characterize cortisol patterns in pregnant elephants. The blood sample was collected twice for every month from four pregnant females, and concentrations of serum progestagens and cortisol were measured by enzyme immunoassay. Gestation was divided into five periods: 0-16 weeks; 17-32 weeks; 33-48 weeks; 49-64 weeks; and 65-90 weeks. Result showed no difference in cortisol concentrations across the five gestational periods ($p > 0.05$), and no positive correlation with progesterone concentration. Thus, in these four females, cortisol concentrations were not influenced by stage of gestation.

KEY WORDS: Asian elephant (*Elephas maximus*), cortisol, enzyme immunoassay, pregnancy, progesterone

The Asian elephant (*Elephas maximus*) is of cultural and economic importance to Thailand; however, most captive populations are not self-sustaining. The Asian elephant is listed in the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) and the International Union for Conservation of Nature (IUCN) [7] as an endangered species. One way to bolster captive populations is to encourage breeding through proper socialization and introduction of males to females. Gestation in the elephant is between 20-22 months [1, 5, 8, 13] but can be influenced by high stress leading to abortion [4]. This raises concerns about whether inappropriate management conditions cause stress in pregnant elephant that leads to abortion. The major stress hormone is cortisol, a steroid produced by the adrenal gland. Cortisol secretion

increases in response to both internal and external stressors in mammals, including the elephant [9-10]. High cortisol indicates an abnormal body condition [3], and may be associated with abortion in elephants. Thus, maintaining normal levels of cortisol may be important for pregnancy maintenance. The objective of this study was to monitor cortisol secretion throughout gestation in captive elephant females.

MATERIALS AND METHODS

Study animals

Blood samples were collected twice a month from four pregnant Asian elephants, and the serum was kept at -20 °C until analysis (Table 1). Gestation was divided into five periods: 0-16 weeks; 17-32 weeks; 33-48 weeks; 49-64 weeks; and 65-90 weeks.

Table 1 List of elephant in this study

ID	Date of sampling
K	June 2005 to January 2007
SK	August 2007 to May 2009
S	December 2003 to September 2005
KT	June 2004 to August 2005

Hormonal analysis

Serum progesterone and cortisol concentrations were measured using enzyme immunoassays [2]. The progesterone assay utilized a monoclonal primary antibody (CL425) at a dilution of 1:10,000 that was coated to 96-wells microtiter plates and stored in 4 °C overnight. Progesterone standards, two controls (high and low) and samples were added, followed by addition of 1:25,000 progesterone-3CMO-horseradish peroxidase and incubation at room temperature for 2 hours. ABTs substrate was added and color development was measured with an ELISA plate reader and filter at 405 nm. Between each step, wells were washed five times with 0.05% tween in 0.877% NaCl.

The cortisol assay used a polyclonal antibody (R4866) at a dilution of 1:10,000 to coat the plate and store at 4 °C overnight. Cortisol standards, control and sample were added, followed by 1:15,000 cortisol-horseradish peroxidase and incubation at room temperature for 1 hour. ABTS was added and plates were read as described above.

Statistical analysis was performed by one-way ANOVA. The correlation between progesterone and cortisol concentrations was determined by a Spearman's correlation test.

RESULTS

The average serum progesterone concentrations throughout gestation in all elephants was 2.95 ± 0.17 ng/ml (ranged from 1.70 ± 0.27 to 3.89 ± 0.38 ng/ml). The

concentrations of progesterone increased significantly in second period of gestation ($p < 0.0001$) and continued to rise until parturition.

The average serum cortisol concentrations throughout gestation in all pregnant elephants was 0.73 ± 0.47 ng/ml, and remained relatively constant throughout gestation (Figures 1 and 2). There was no correlation ($R = 0.24$; $p > 0.05$) between progesterone and cortisol concentrations during gestation (Figure 2).

DISCUSSION AND CONCLUSIONS

In our study, high concentrations of progesterone were maintained during the last period of gestation (2.95 ± 0.32 ng/ml), up to 30 days before parturition. In other reports, serum progesterone declines during the last month with a rapid decrease 2-3 day before parturition [1, 5, 13]. We may not have been able to observe these declines because of the limited sampling towards the end of gestation.

Cortisol concentrations were unaffected by pregnancy stage and remained relatively constant throughout gestation This finding agrees with a previous report by [12] that found no differences in cortisol levels during the periparturient period as compared to the rest of gestation. [6] also reported overall serum cortisol concentrations remained relatively stable from the 1st to the 20th month of gestation, although after that they increased until parturition. There were no cortisol surges detected in the final weeks of gestation in contrast to [11], who observed two cortisol surges in blood at the end of the gestation in both African and Asian elephants, and suggested cortisol may play a role in parturition. One reason for the absence of periparturient surges in cortisol in our study may have been the low sampling frequency in the two months preceding parturition. Nevertheless, we have begun to characterize cortisol secretory profiles in healthy elephants that successfully gave

Figure 1. Mean \pm SEM concentrations of serum cortisol during gestation.

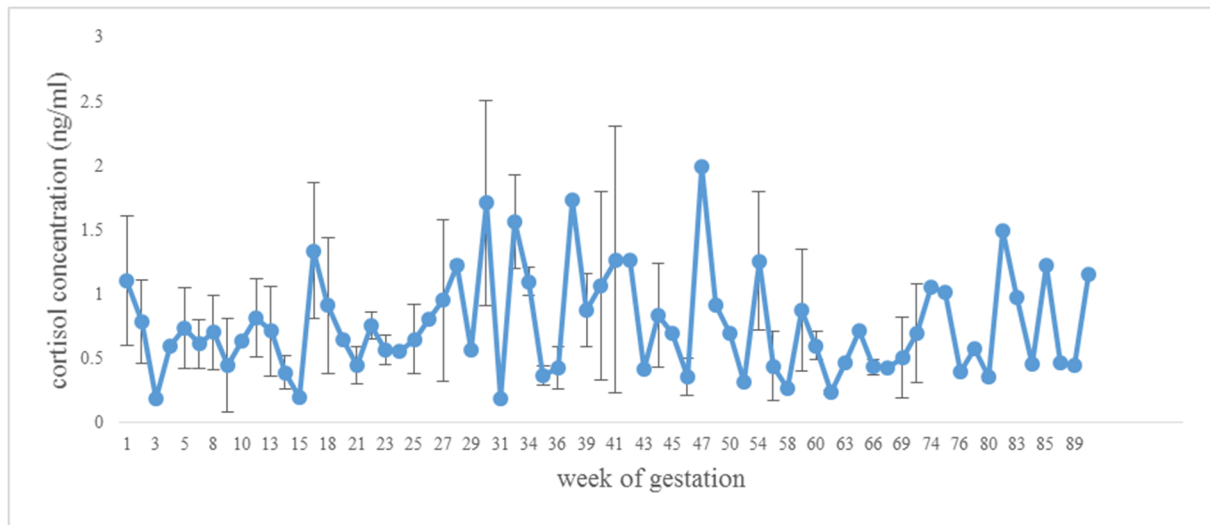
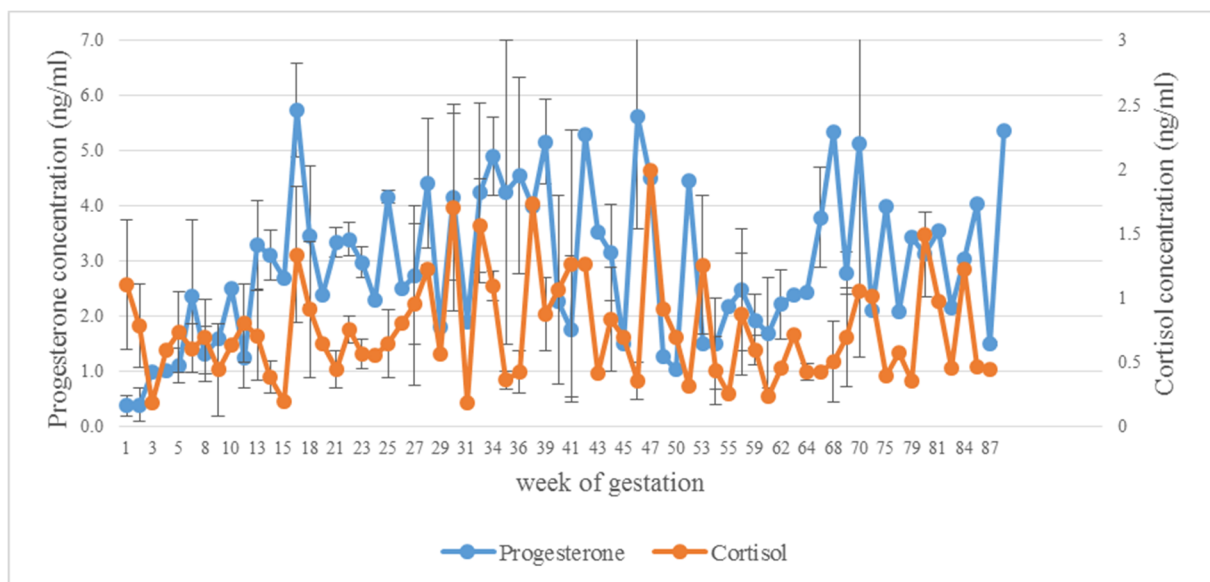


Figure 2. Mean \pm SEM concentrations of serum progesterone and cortisol during gestation.



birth. We concluded that evaluation of cortisol, in addition to progesterone, in pregnant elephants could aid management by identifying problems, perhaps related to stress, before they can affect pregnancy maintenance.

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Wildlife Conservation in Myanmar: Challenges and Threats

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Myanmar, the second largest country in Southeast Asia, is one of the most important biodiversity hotspots on the planet. The numerous varying landscapes and seascapes in Myanmar are home to a wide range of habitats and wildlife. However, a nationwide comprehensive survey on wild flora and fauna has not yet been possible. To date, most of the scientific work on biodiversity has been project- or site-based. According to Myanmar's fifth National Report to United Nations Convention on Biological Diversity (2014), the total number of known species by taxonomic group is 824 plants, 252 mammals, 1,056 birds, 293 reptiles, 139 amphibian and 775 fish. Although Myanmar is rich in natural resources, it is one of the poorest and least developed countries in the world. Historically, Myanmar was the global leading exporter of teak, rice, and gems, but political and economic isolation over the past 50 years has created severe hardships for its people. The major threats to biodiversity in Myanmar are improper land use; illegal hunting and trade; the introduction of invasive species; infrastructure development; and climate change. Underlying factors include poverty; economic growth and increasing consumption; increased demand on natural resources from neighbouring countries; limited environmental safeguards; lack of comprehensive land-use policies and planning; undervaluation of ecosystems, ecosystem services, and biodiversity (particularly in development planning); and limited grassroots support for conservation. Climate change can exacerbate anthropogenic threats (such as extensive deforestation) to biodiversity. Short- and long-term climate change effects will interact with prevailing threats to species and ecosystems synergistically and in unpredictable ways to further complicate biodiversity conservation. Climate change can be expected to aggravate existing threats to biodiversity in Myanmar through (a) direct mechanisms such as loss of suitable habitat for species or reduced resilience within ecosystems and (b) indirectly, through its impacts on humans and their dependence on the products and services produced by terrestrial, freshwater, and marine ecosystems.

Keywords: Myanmar, conservation, biodiversity, challenges, anthropogenic threats, climate change

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Event Timetable

15 th OCT 2015 (University of Veterinary Science, Yezin)			
9:00-12:00	ASZWM 2015 Pre-Educational Workshop		
17 th OCT 2015 (Yangon Zoological Garden, Yangon)			
8:30 –9:00	Registration		
9:00-9:30	Opening Ceremony		
9:30-12:00	Mycobacterium ASCM-WDA Joint Session		
12:15-13:30	Lunch Break and Poster Presentation		
13:30-14:30	Networking Session		
14:30-15:15	Disease Ecology Session		
15:15-15:30	Tea Break		
15:30-	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; text-align: center;">Room 1 Marine Mammals Session</td> <td style="width: 50%; text-align: center;">Room 2 Basic Science Session</td> </tr> </table>	Room 1 Marine Mammals Session	Room 2 Basic Science Session
Room 1 Marine Mammals Session	Room 2 Basic Science Session		
16:45-17:30	Zoo Vet Networking		
18:30	Welcome Party		
18 th OCT 2015			
9:30-12:15	Elephant Session		
12:15-13:30	Lunch Break and Poster Presentation		
13:30-14:45	Clinical Medicine Session		
14:45-15:00	Tea Break		
15:00-16:15	Clinical Medicine Session – continue		
16:15-17:30	Pathology and Parasitology Session		
17:30	Closing Ceremony		
19 th OCT 2015			
Post-congress Workshop (Yangon)			

Abbriivation of Scope

AP – Anatomy and physiology
BS – Basic science
CM – Clinical medicine
DE – Disease ecology
ELE – Elephant
INF – Infectious disease
JO – Joint session
MM – Marine mammals
PP – Pathology and parasitology
PA – Pathology
PAR – Parasitology
WM – Wildlife management and conservation
ZVN – Zoo veterinary networking