

TOPIC 3. DRUG EFFECTS, SEROLOGY, AND PHYSICAL RESTRAINING DEVICES

This TOPIC 3 contains references to three areas of activity that are related to studies of both healthy and diseased animals. Drugs are used to immobilize and tranquilize, serology is important in diagnosis and in the treatment of disorders, and physical restraining devices are used when working with animals. The reference lists will be useful to someone considering different techniques, providing efficient access to the published literature.

UNIT 3.1: DRUG EFFECTS

Drugs are used for two main purposes when working with wild ruminants: immobilization and tranquilizing. An immobilizing agent does just that and nothing more; drugs that immobilize make it impossible for an animal to move, but the animal is fully conscious and presumably receiving environmental stimuli without being able to exhibit a behavioral response. A tranquilizer reduces the level of awareness of an animal. A tranquilized animal may still be mobile, but not as excitable. Heavy doses of a tranquilizer will also immobilize an animal.

Wild animals, being alert, excitable, elusive, and very hard to handle are prime candidates for immobilizing and tranquilizing drugs during research work. The effects of drugs on the physiology and metabolism are generally not well-known. The importance of several metabolic rhythms in relation to dosage levels is being understood (see CHAPTER 7).

The number of references that follow indicate a fairly large amount of activity in this area, all confined to the last 20 years.

REFERENCES, UNIT 3.1

DRUG EFFECTS

SERIALS

CODEN	VO-NU BEPA ENPA ANIM KEY WORDS-----	AUTHORS-----	YEAR
JWMAA	31--4 686 692 cerv diazepam, capture handlin thomas,jw; robin/	1967	
NOVTA	22--- 385 400 cerv capt. immob with neurolept eriksen,e		1970

CODEN	VO-NU BEPA ENPA ANIM KEY WORDS-----	AUTHORS-----	YEAR
CNJMA	26--3 57 61 od-- tranquiliz, immobilization cowan,i mct; woo/	1962	
JAVMA	147-- 1099 1101 od-- chlor hydra-halo-nitr-oxi wolff,wa; davis,	1965	
JWMAA	41--2 313 315 od-- transm syr to recov imm de lovett,jw; hill,e	1977	

CODEN	VO-NU BEPA ENPA ANIM KEY WORDS-----	AUTHORS-----	YEAR
APAVD	1976- 185 194 odvi succinylcholine in deer kitchen.h		1976
CJZOA	57--4 756 767 odvi infl chem imm blood charac wesson,ja; scanl/	1979	
CJZOA	57--4 768 776 odvi infl chem imm ster hor lev wesson,ja, scanl/	1979	
COVEA	40--- 275 282 odvi anesthetization white-t de severinghaus,cw	1950	
CPSCA	3.... 236 243 odvi trauma, secondary shock in flyger,vf; ridge/	1962	
JAVMA	157-5 636 640 odvi immob cap, free, etor hy c woolf,a	1970	
JAVMA	167-7 574 576 odvi xylazine immob agent, capt roughton,rd	1975	
JWIDA	9---4 336 341 odvi seda immobil etorph & xyla presnell,kr; pre/	1973	
JWIDA	9---4 342 348 odvi combin etorphine, xylazine presidente,pja; /	1973	
JWIDA	15--4 537 541 odvi blow-gun syring, captiv de warren,rj; schau/	1979	
JWMAA	17--4 516 520 odvi flaxedil, paralysis, w-t d hall,tc; taft,eb/	1953	
JWMAA	21--2 213 220 odvi nicotine salicylate, captu crockford,ja; ha/	1957	
JWMAA	28--1 173 175 odvi mort, thor area, cap-chur thomas,jw; marbur	1964	
JWMAA	29--4 889 890 odvi nicotine, field immobiliza behrend,df	1965	
JWMAA	31--4 844 845 odvi device for immob trapped d white,cm	1967	
JWMAA	34--1 207 209 odvi succin chlor, hyaluronidas allen,tj	1970	
JWMAA	36--4 1034 1040 odvi effe immobil on blood anal seal,us; ozoga,j/	1972	
JWMAA	40--3 447 453 odvi seas var, succ chol immobi jacobsen,nk; arm/	1976	

odvi continued on the next page

CODEN VO-NU BEPA ENPA ANIM KEY WORDS-----				AUTHORS-----	YEAR
JZAMD 5---2	18	18	odvi ceel, m99, recov w/ m50-50 woolf,a		1974
PCGFA 28---	500	506	odvi succinylcho, react, physi wesson,ja,III; s/	wesson,ja,III; s/	1974
WLSBA 5---4	193	194	odvi aggress toward immobi deer scanlon,pf; mira/	scanlon,pf; mira/	1977

CODEN VO-NU BEPA ENPA ANIM KEY WORDS-----				AUTHORS-----	YEAR
JAVMA 155-7	1080	1084	odhe new tech, restr antlerless sauer,bw; gorman/	sauer,bw; gorman/	1969
JAVMA 171-9	987	987	odhe odvi, ketamine xylazine im richter,ag	richter,ag	1977
JWIDA 14--4	519	522	odhe methoxyfluran anesth, fawn trindle,bd; lewis	trindle,bd; lewis	1978
JWMAA 25--2	202	203	odhe anesthetizin deer by arrow anderson,cf	anderson,cf	1961
JWMAA 26--3	332	333	odhe succinylcho chloride, colo foyd,rj	foyd,rj	1962
JWMAA 27--2	297	299	odhe effects of succinyl chlori pearson,ha; smit/	pearson,ha; smit/	1963
JWMAA 32--1	195	197	odhe succinyl chlor, immobiliza miller,f1	miller,f1	1968
JWMAA 33--4	1037	1038	odhe new dev for inject powdere liscinsky,sa; ho/	liscinsky,sa; ho/	1969
JWMAA 37--1	82	86	odhe immob, phencyc hydro chlor dean,r; hines,ww/	dean,r; hines,ww/	1973

CODEN VO-NU BEPA ENPA ANIM KEY WORDS-----				AUTHORS-----	YEAR
IABLA 6....	45	50	ceel immob of marals by ditilin ushakov,kp; shol/	ushakov,kp; shol/	1971
JAVMA 169-9	888	889	ceel yg eff, etor hydroc in dam farnsworth,rj; st	farnsworth,rj; st	1976
JWIDA 13--3	258	261	ceel immob, etorphine hydchlori magonigle,ra; st/	magonigle,ra; st/	1977
JWMAA 23--3	365	366	ceel curare, curare-like drugs post,g	post,g	1959
JWMAA 26--3	334	336	ceel succinylcholine chloride flook,dr; robert/	flook,dr; robert/	1962
JWMAA 29--2	339	345	ceel roosevelt elk, succin chlo harper,ja	harper,ja	1965
JWMAA 39--4	814	816	ceel m99, immobilis rocky mt elk coggins,v1	coggins,v1	1975
VETRA 93--3	86	87	ceel caca, ceni, immobilon,deer low,rj	low,rj	1973
VETRA 93--4	113	114	ceel caca, dada, immobilon,deer chapman,d	chapman,d	1973
VETRA 93--4	114	115	ceel immobilon in deer, scotlnd sharman,gam	sharman,gam	1973
VETRA 94--5	85	86	ceel hypersen isol pop to xylaz fletcher,j	fletcher,j	1974
VETRA 99-21	424	424	ceel anaesthesia in red deer whitelaw,a; fawce	whitelaw,a; fawce	1976

CODEN VO-NU BEPA ENPA ANIM KEY WORDS----- AUTHORS----- YEAR

JAVMA 175-9 916 917 alal hyaluronidase in immob mix haigh,jc 1979

JOMAA 51--2 396 399 alal M99 etorphine, immobilizat houston,db 1970

JWMAA 25--3 326 328 alal narcosis, moose, nicotine rausch,ra; ritcey 1961
 JWMAA 33--3 534 537 alal shiras moose, immobilizatn houston,db 1969
 JWMAA 39--3 634 636 alal physiologic effect, m-99 e roussel,ye; pate/ 1975
 JWMAA 42--3 686 690 alal etorp & xylaz hydroc, immo gasaway,wc, fran/ 1978

JZAMD 5---2 26 31 alal immobiliz of alaskan moose franzmann,aw; arn 1974
 JZAMD 8---3 22 29 alal fentanyl & xylazine, captu haigh,jc, stewart/ 1977

CODEN VO-NU BEPA ENPA ANIM KEY WORDS----- AUTHORS----- YEAR

JWMAA 28--1 49 53 rata newfoundl, succinyl, moose bergerud,at; but/ 1964

CODEN VO-NU BEPA ENPA ANIM KEY WORDS----- AUTHORS----- YEAR

JWMAA 31--4 840 842 anam succin chlor, immobilizati beale,dm; smith,a 1967

CODEN VO-NU BEPA ENPA ANIM KEY WORDS----- AUTHORS----- YEAR

PIAIA 83--2 67 70 bibi immob adult bull, etorphin haugen,ao; swens/ 1976

CODEN VO-NU BEPA ENPA ANIM KEY WORDS----- AUTHORS----- YEAR

JWMAA 40--1 174 176 ovca succ chlor, phencyc hydroc stelfox,jg; rober 1976

CODEN VO-NU BEPA ENPA ANIM KEY WORDS----- AUTHORS----- YEAR

ovda

CODEN VO-NU BEPA ENPA ANIM KEY WORDS----- AUTHORS----- YEAR

JWMAA 39--1 112 117 obmo immob, marking, arct canad jonkel,cj; gray,/ 1975
 ZOGAA 40... 138 142 obmo sedation of a bull muskox jones,dm 1971

CODEN VO-NU BEPA ENPA ANIM KEY WORDS----- AUTHORS----- YEAR

APAVD 1975- 40 42 many xylazine, exotic anim prac hertzog,re 1975
 VTYMA 69--5 548 551 many injectab anesth, wld rumin boever,wj; paluch 1974
 ZOGAA 35... 149 155 anim eff tranq, anesth, wild an nouvel,j; rinjar/ 1968

CODEN VO-NU BEPA ENPA ANIM KEY WORDS----- AUTHORS----- YEAR

APAVD 1975- 16 39 ungu clin use rompun, toron zoo rapley,wa; mehren 1975
 ZOOAA 1---1 231 238 ungu use of (ROCHE), tranquiliz hirst,sm; kett 1965
 ZOOAA 1.... 239 247 ungu experim immobilis ungulates bigalke,rc 1965
 ZOGAA 33... 182 185 ungu immobilis ungula catsk ga fa heck,h; douigh,f 1967

CODEN VO-NU BEPA ENPA ANIM KEY WORDS----- AUTHORS----- YEAR

JAVMA 130-- 479 482 dogo nicotine, immobiliz, goats hayes,fa; jenkin/ 1957
 JWMAA 27--2 292 296 new tech using cap-chur gu green,h 1963
 JWMAA 33--4 1037 1038 device, inject powdered dr liscinsky,sa; ho/ 1969

CODEN VO-NU BEPA ENPA ANIM KEY WORDS----- AUTHORS----- YEAR

BVJOA 131.. 545 548 dada diazepam, sedat & restrain done,sh; lees,p;/ 1975
 JZAMD 4---2 21 21 dada restrain 2 dee w/ xylazine klide,am; klein,l 1973
 VETRA 93--1 26 27 dada immobilon in fallow deer jones,dm; manton, 1973
 VETRA 93-16 454 455 dada immobilisation, fallow dee low,rj 1973
 VETRA 93-16 455 455 dada immobilisation fallow dee lees,p; done,sh 1973
 VETRA 94-16 362 363 dada immobilon-rompun fallow de harrington,r; wil 1974
 VETRA 94-17 396 398 dada powd succ chlo in dart, im scanlon,pf 1973
 VETRA 100-- 386 387 dada fentanyl & neuroleptic, im haigh,jc 1977

CODEN VO-NU BEPA ENPA ANIM KEY WORDS----- AUTHORS----- YEAR

VETRA 95--3 71 71 axax tranquilising deer sutherland,c; hod 1974

CODEN VO-NU BEPA ENPA ANIM KEY WORDS----- AUTHORS----- YEAR

JAVMA 169-9 890 893 elda immobiliz pere davids deer smeller,j; bush,/ 1976

CODEN VO-NU BEPA ENPA ANIM KEY WORDS----- AUTHORS----- YEAR

ATRLA 12-32 467 470 bibo narcos, chlor hydra, eth a piwowarczyk,s 1967
ATRLA 12-32 471 472 bibo use of palmer gun, immobil starzynski,w 1967
ATRLA 12-32 473 475 bibo eu bis hybrid, suxamethoni zaniewski,l 1967

ZOPOA 25--2 85 98 bibo etorphine hydrochlo, immob kania,bf; teuchma 1975

UNIT 3.2: SEROLOGY

Serology is the science dealing with the properties and use of serum, or body fluids. Blood serum is the fluid considered most; it is important for its agents of immunity and its role as an antitoxin. References to serology follow, providing access to the published literature on the wild ruminants.

REFERENCES, UNIT 3.2

SEROLOGY

SERIALS

CODEN	VO-NU BEPA ENPA ANIM KEY WORDS-----	AUTHORS-----	YEAR
AGVIA	37--2 282 284 od-- antigenic rel, epiz, bluet moore,d1; lee,vh		1972
AJVRA	35-12 1529 1531 od-- appendage-related antigen carson,ca; weisi/		1974
AJVRA	36--9 1367 1370 od-- leptospiral antibodies in harrington,r,jr		1975
AUVJA	51--4 185 189 od-- doca, dosh, serolog method boulanger,p; fran		1975
JAVMA	132-7 289 292 od-- infect, antibody, anaplasm christensen,jf; /		1958
JAVMA	132-7 293 296 od-- serol surv, leptospi, mass reynolds,im; smit		1958
JAVMA	167-7 565 568 od-- surv, toxoplas-gondii anti franti,ce; conno/		1975
JAVMA	175-9 911 913 od-- serologic profile of exoti riemann,hp; rupp/		1979
JWIDA	6---4 479 482 od-- sero ev, arbovir, wis, tex issel,cj; hoff,g/		1970
JWMAA	30--4 777 780 od-- serol stud, epiz hemorra d wilhelm,ar; train		1966
PCGFA	13... 174 177 od-- poisonous plants, s e dise hayes,fa; jenkins		1959
PIAIA	74--- 78 86 od-- incid, dis antibodie, iowa haugen,ao		1968

CODEN	VO-NU BEPA ENPA ANIM KEY WORDS-----	AUTHORS-----	YEAR
AJTHA	21--6 979 988 odvi experimental studies with issel,cj; traine/		1972
AJTHA	23--2 242 245 odvi maternal antibod, jamestow issel,cj		1974
AJVRA	31--5 879 883 odvi serodiagnosis, theileriasi gadir,fa; hidalg/		1970
AJVRA	33-12 2545 2549 odvi elect dist, serol ch, arth sikes,d; kistner/		1972
CNVJA	3---3 71 78 odvi cul, ser evi, lepto, ontar abdulla,pk; kars/		1961
	odvi continued on the next page		

CODEN VO-NU BEPA ENPA ANIM KEY WORDS----- AUTHORS----- YEAR

JWIDA 9---3 245 248 odvi infection in texas, califo issel,cj; hoff,g/ 1973
JWIDA 9---4 291 295 odvi odhe, arbovir serol, n dak hoff,gl; issel,c/ 1973
JWIDA 11--2 195 200 odvi serol.venez eq enceph, tex smart,dl; traine/ 1975
JWIDA 12--3 322 325 odvi antibo toxoplasm gond, ont tizard,ir; bille/ 1976
JWIDA 13--1 9 16 odvi transm 2 strains epizootic foster.nm; breck/ 1977

WDABB 3---4 152 155 odvi chlamydia antibody study debbie,jg 1967
WDABB 5---4 392 397 odvi serolo surv, arbovirus, ny whitney,e; roz,a/ 1969
WDABB 6---4 295 298 odvi leptospiral antibodies, us shotts,eb,jr; hay 1970

CODEN VO-NU BEPA ENPA ANIM KEY WORDS----- AUTHORS----- YEAR

JWIDA 12--3 427 434 odhe card agglut test, anaplas howarth,ja; hoka/ 1976
JWIDA 13--4 429 431 odhe ceel, anam, survey, titers adrian.wj; keiss, 1977
JWIDA 14--2 193 202 odhe hemaglut test, epidem, lep cirone,sm; riema/ 1978
JWIDA 14--4 523 527 odhe stress, immune system trindle,bd; lewi/ 1978
JWIDA 15--1 25 31 odhe tech eval immunity brindle,bd; lewis 1979
JWIDA 15--3 443 446 odhe serol sympatric sheep, mul hampy,b; pence,d/ 1979

JWMAA 41--3 515 519 odhe preval reactor, lives path stauber,eh; nell/ 1977

WDABB 4---3 78 80 odhe serol surv, arbovir, calif emmons,rw 1968

CODEN VO-NU BEPA ENPA ANIM KEY WORDS----- AUTHORS----- YEAR

COVEA 69--4 402 410 ceel eval anaplas rapid card ag magonigle,ra; ec/ 1979
FPARA 23--1 25 31 ceel caca, leptospiral an, wild sebek,z; kaasere/ 1976
JOMAA 17--3 250 253 ceel oservat on yellowstone elk mills,hb 1936

JWIDA 14--1 74 81 ceel brucell, serol, bacti, wyo thorne,et; morto/ 1978
JWIDA 14--4 471 478 ceel odhe, serologi study, utah merrell,cl; wrigh 1978
JWIDA 15--3 379 386 ceel eval anaplams card agglut renshaw,hw; mago/ 1979

NATUA 241-- 476 477 ceel antibody to babesia, red d latif,bma; adam,k 1973

RVTS 23--2 133 138 ceel occur antib to babesia, lo adam,kmg; beasley/ 1977

CODEN VO-NU BEPA ENPA ANIM KEY WORDS----- AUTHORS----- YEAR

AJTHA 22--5 654 661 alal rata, arbovi, serol,finlnd brummer-korvenkon 1973
JWIDA 7---2 93 95 alal surv, antibod, bovin virus thorsen,j; hender 1971
JWIDA 7---2 118 119 alal evid, arbovir activ, alber trainer,dd; hoff, 1971

CODEN VO-NU BEPA ENPA ANIM KEY WORDS----- AUTHORS----- YEAR

AJTHA 22--3 400 403 rata doca, arboviruses in finla saikku,p 1973

AVCSA 17--3 363 369 rata doca, occur antib, chlamdi neuvonen,e 1976

CODEN VO-NU BEPA ENPA ANIM KEY WORDS----- AUTHORS----- YEAR

JOPAA 56--4 759 767 anam dosh, immun, haemonch isol allen,rw; samson/ 1970

JWIDA 11--2 157 163 anam serol surv, albert, saskat barrett.mw; chalm 1975
JWIDA 16--1 109 109 anam seroepidem survey, idaho stauber,eh; aute/ 1980

TMPRA 25--2 217 226 anam doca, detect fluor agg ant lohr,kf; ross,jp/ 1974

CODEN VO-NU BEPA ENPA ANIM KEY WORDS----- AUTHORS----- YEAR

JWIDA 9---4 306 310 bibi vaccination against pasteu heddleston,kl; we 1973

JWIDA 14--3 329 332 bibi serol surv brucell, canada choquette,lpe; b/ 1978

JWIDA 14--4 493 500 bibi serol, hemato values, colo keith,eo; ellis,/ 1978

CODEN VO-NU BEPA ENPA ANIM KEY WORDS----- AUTHORS----- YEAR

CEXIA 8---2 345 354 ovca in vitro detect, homocytot hudson,rj; bandy/ 1971

CJCMA 36--1 69 73 ovca cell adherence react, lung hudson,rj; bandy/ 1972

DABBB 33B-8 3819 3820 ovca devel pasteurella bacterin nash.p 1973

JWIDA 6---2 105 106 ovca electrophoresis, monitorin hudson,r; kitts,/ 1970

JWIDA 7---3 171 174 ovca immuno globulin resspone hudson,r; kitts,/ 1971

JWIDA 9---1 7 11 ovca electrophor, chron pneumon woolf,a; nadler,/ 1973

JWIDA 9---1 12 17 ovca mort, clin, hema, path obs woolf,a; kradel,d 1973

JWIDA 10--2 107 110 ovca serol survey, viral infect parks,jb; england 1974

CODEN VO-NU BEPA ENPA ANIM KEY WORDS----- AUTHORS----- YEAR

ovda

CODEN VO-NU BEPA ENPA ANIM KEY WORDS----- AUTHORS----- YEAR

obmo

CODEN VO-NU BEPA ENPA ANIM KEY WORDS----- AUTHORS----- YEAR

JWMAA 35--4 752 756 oram white muscle dis, br colum herbert,dm; cowan 1971

CODEN VO-NU BEPA ENPA ANIM KEY WORDS----- AUTHORS----- YEAR

AJEPA 90--4 354 358 many serol evid arbovi, wild ru trainer,do; hano 1969

AJVRA 30-11 2007 2011 many ser evi,blue tongue,n amer trainer,dd; jochi 1969

JANSA 17--1 224 236 doan ser trans, white muscl dis blinko,c; dye,wb 1958

JWIDA 12--3 322 325 mamm prev toxoplas antibod, ont tizard,ir; bille/ 1976

JWIDA 12--3 326 334 many prev, dist, 4 serotyp smsv smith,aw; akers,/ 1976

JWIDA 13--4 429 431 many brucello, leptospiro, colo adrian,wj; keiss, 1977

TMPRA 29--2 223 233 ungu preva trypanosome carriers drager,n; mehlitz 1978

VETRA 92--5 119 119 mamm antib to leptospira grippo twigg,gi; hughes/ 1973

CODEN VO-NU BEPA ENPA ANIM KEY WORDS----- AUTHORS----- YEAR

JWIDA 15--2 339 341 dada antigen, herpes virus, alb kinyili,jh; thors 1979

UNIT 3.3: PHYSICAL RESTRAINING DEVICES

Any device used to restrain a wild ruminant has a potential effect on its physiology and metabolism. Restraint devices are necessary for some kinds of studies. A few references with descriptions of restraining devices, cages, etc. are listed. The philosophy of handling of wild ruminants in captivity is very important. I personally believe that they should be treated as naturally and with as little restraint as possible, and not as domestic cattle or sheep that are penned, tied, and herded around at will.

REFERENCES, UNIT 3.3

PHYSICAL RESTRAINING DEVICES

SERIALS

CODEN VO-NU BEPA ENPA ANIM KEY WORDS----- AUTHORS----- YEAR

CJZOA 57--4 756 767 odvi blood char, inf phys res & wesson, ja, III; s/ 1979
CJZOA 57--4 768 776 odvi ster hor lev, inf phy re & wesson, ja, III; s/ 1979

JWMAA 31--2 359 361 odvi rope truss for restraining thomas, jw; robin/ 1967
JWMAA 38--4 845 847 odvi restr appar, blood samplin mautz, ww; daviso/ 1974

CODEN VO-NU BEPA ENPA ANIM KEY WORDS----- AUTHORS----- YEAR

odhe

CODEN VO-NU BEPA ENPA ANIM KEY WORDS----- AUTHORS----- YEAR

ceel

CODEN VO-NU BEPA ENPA ANIM KEY WORDS----- AUTHORS----- YEAR

alal

CODEN VO-NU BEPA ENPA ANIM KEY WORDS----- AUTHORS----- YEAR

JWMAA 42--4 904 908 rata ef han, restr, blood param karns, pd; crichto 1978

CODEN VO-NU BEPA ENPA ANIM KEY WORDS----- AUTHORS----- YEAR

anam

CODEN VO-NU BEPA ENPA ANIM KEY WORDS----- AUTHORS----- YEAR

ATRLA 12-32 477 479 bibi immobilizing cage for biso krasinska, m 1967

CODEN VO-NU BEPA ENPA ANIM KEY WORDS----- AUTHORS----- YEAR

ovca

CODEN VO-NU BEPA ENPA ANIM KEY WORDS----- AUTHORS----- YEAR

ovda

CODEN VO-NU BEPA ENPA ANIM KEY WORDS----- AUTHORS----- YEAR

obmo

CODEN VO-NU BEPA ENPA ANIM KEY WORDS----- AUTHORS----- YEAR

oram

CODEN VO-NU BEPA ENPA ANIM KEY WORDS----- AUTHORS----- YEAR

WLMOA 14--- 1 78 many pharm, physio princ, restr hartoorn, am 1965

CLOSING COMMENTS

CHAPTER 10 includes a large number of references to literature that has not yet been synthesized into ecological considerations. The factors affecting physiology and metabolism must in turn affect productivity, and productivity, in turn, affects population dynamics. The discussions in CHAPTERS 18 and 19 will relate to the literature listed here in CHAPTER 10, especially for mortality data.

Special thanks are due Dr. Susan Wade, College of Veterinary Medicine at Cornell, for sorting the long lists of references into the units in this chapter. We hope that the readily available lists for each wild ruminant species will be of value to those reviewing this literature.

Aaron N. Moen
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GLOSSARY OF CODENS - CHAPTER TEN

CODEN

ACVTB	Acta Veterinaria Brno
AEHLA	Archives of Environmental Health
AESAA	Annals of the Entomological Society of America
AGBOB	Agroborealis
AGVIA	Archiv fur die Gesamte Virusforschung
AJEPA	American Journal of Epidemiology
AJHEA	American Journal of Public Health
AJPAA	American Journal of Pathology
AJTHA	American Journal of Tropical Medicine and Hygiene
AVJRA	American Journal of Veterinary Research
AMFOA	American Forests
AMNAA	American Midland Naturalist
ANYAA	Annals of the New York Academy of Sciences
APAVD	American Association Zoo Veterinarian Annual Proceedings
APMIA	Acta Pathologica et Microbiologica Scandinavica
APRPA	Acta Parasitologica Polonica
ASISA	Atti della Societa Italiana delle Scienze Veterinarie
ASMAC	Abstracts of the Annual Meeting of the American Society for Microbiology
ATMPA	Annals of Tropical Medicine and Parasitology
ATRLA	Acta Theriologica (Poland)
AUMGA	Audubon Magazina
AUVJA	Australian Veterinary Journal
AVCSA	Acta Veterinaria Scandinavica (Denmark)
AVSPA	Acta Veterinaria Scandinavica Supplementum (Denmark)
AZATA	Arizona Agricultural Experiment Station Technical Bulletin
BAPBA	Bulletin de l'Academie Polonaise des Sciences Serie de Sciences Biologiques
BECTA	Bulletin of Environmental Contamination and Toxicology
BEREA	Bulletin of Entomological Research
BJDEA	British Journal of Dermatology
BMSCB	Bulletin of the Missouri Academy of Science Supplement
BPURD	Biological Papers of the University of Alaska Special Report
BSKBA	Bulletin of the University of Osaka Prefecture Series B Agriculture and Biology
BVJOA	British Veterinary Journal
CAENA	Canadian Entomologist
CAFGA	California Fish and Game
CAFNA	Canadian Field Naturalist
CATRB	Calcified Tissue Research
CBCPA	Comparative Biochemistry and Physiology
CELLB	Cell
CEXIA	Clinical and Experimental Immunology
CJCMA	Canadian Journal of Comparative Medicine
CJMIA	Canadian Journal of Microbiology

CJPEA	Canadian Journal of Public Health
CJZOA	Canadian Journal of Zoology
CNDRA	Condor
CNJMA	Canadian Journal of Comparative Medicine and Veterinary Science
CNJNA	Canadian Journal of Animal Science
CNRDA	Canadian Journal of Research, Section D, Zoological Sciences
CNREA	Cancer Research
CNSVA	Conservationist
CNVJA	Canadian Veterinary Journal
COVEA	Cornell Veterinarian
CPSCA	Chesapeake Science
CVTJA	Ceylon Veterinary Journal
DABBB	Dissertation Abstracts International
DKBSA	Doklady (Biological Sciences, Proceedings of the Academy of Sciences of the USSR) (English translation of DOBTA)
DOBTA	Doklady Akademii Nauk SSSR Biological Science Section (for English translation see DKBSA)
ECOLA	Ecology
ENAMA	Entomologica Americana
ESTHA	Environmental Science and Technology
ETBRA	Entomologische Berichten (Amsterdam)
EVETB	Environmental Entomology
FLUOA	Fluoride
FPARA	Folia Parasitologica
FPWTA	Transactions of the Federal-Provincial Wildlife Conference
GRBNA	Great Basin Naturalist
GRLEA	Great Lakes Entomologist
HLTPA	Health Physics
IABLA	Izvestiya Akademii Nauk Azerbaidzhanskoi SSR, Seriya Biologicheskikh Nauk
IJAHA	Indian Journal of Animal Health
IJLAA	Indian Journal of Animal Sciences
INFIB	Infection and Immunity
IVEJA	Indian Veterinary Journal
IZSPB	USDA Index Catalogue of Medical and Veterinary Zoology Special Publication
JAASA	Journal of the Alabama Academy of Science
JANSA	Journal of Animal Science
JAVMA	Journal of the American Veterinary Medical Association
JCPVA	Journal of Comparative Pathology
JEBCA	Journal of Entomological Society of British Columbia
JEENA	Journal of Economic Entomology
JEMEA	Journal of Experimental Medicine
JEZOA	Journal of Experimental Zoology
JFUSA	Journal of Forestry

JIDEA Journal of Investigative Dermatology
JIDIA Journal of Infectious Diseases
JKESA Journal of the Kansas Entomological Society
JMENA Journal of Medical Entomology
JNCIA Journal of the National Cancer Institute
JNYEA Journal of the New York Entomological Society
JOHLA Journal of Helminthology
JOHYA Journal of Hygiene
JOMAA Journal of Mammalogy
JONUA Journal of Nutrition
JOPAA Journal of Parasitology
JPROA Journal of Protozoology
JRMGA Journal of Range Management
JRPFA Journal of Reproduction and Fertility
JWIDA Journal of Wildlife Diseases
JWMAA Journal of Wildlife Management
JZAMD Journal of Zoo Animal Medicine
JZOOA Journal of Zoology

KLVBA Kongelige Veterinaer-og Landbohojskole Arsskrift

LANCA Lancet

MISTB Transactions Missouri Academy of Science
MMLRA Mammal Review
MUATA Minnesota Agricultural Experiment Station Technical Bulletin

NATUA Nature (England)
NATWA (Die) Naturwissenschaften
NAVEA North American Veterinarian
NAWTA North American Wildlife and Natural Resources Conference,
Transactions of the,
NCANA Naturaliste Canadien, Le
NEZTA New Zealand Veterinary Journal
NFGJA New York Fish and Game Journal
NOSCA Northwest Science
NOVDA Norsk Veterinaertidsskrift
NOVTA Nordisk Veterinaermedicin
NPSMD United States National Park Service Scientific Monograph Series
NYCOA New York State Conservationist
NZASA New Zealand Agricultural Science
NZJSA New Zealand Journal of Science

OUOKA Outdoor Oklahoma

PAAZA Progressive Agriculture in Arizona
PAHUA Parasitologia Hungarica
PARAA Parasitology
PAVEA Pathologia Veterinaria
PCGFA Proceedings of the Southeastern Association of Game and Fish
Commissioners

PHSWA	Proceedings Helminthological Society of Washington
PIIAA	Proceedings of the Iowa Academy of Science
PMASA	Proceedings of the Montana Academy of Sciences
PNDAA	Proceedings of the North Dakota Academy of Science
POASA	Proceedings of the Oklahoma Academy of Science
PPASA	Proceedings of the Pennsylvania Academy of Science
PPETA	Pan-Pacific Entomologist
PPPAA	Pacific Science Congress Proceedings
PRLBA	Proceedings of the Royal Society of London B Biological Sciences
PSDAA	Proceedings of the South Dakota Academy of Science
PSEBA	Proceedings of the Society for Experimental Biology and Medicine
PUNMA	Proceedings of the United States National Museum
PYTCA	Phytochemistry
PZSLA	Proceedings of the Zoological Society of London
RHDRA	Radiological Health Data and Reports
RSZOA	Revue Suisse de Zoologie
RVETA	Refuah Veterinarith
RVTSR	Research in Veterinary Science
SABOA	Sabouraudia
SAGCA	Science in Agriculture
SBJOD	Science of Biology Journal
SCIEA	Science
SEHEA	Seminars in Hematology
SENTD	Southwestern Entomologist
TAEPA	Texas Agricultural Experiment Station Progress Report
TAMSA	Transactions of the American Microscopical Society
TGMEA	Tropical and Geographical Medicine
TISAA	Transactions of the Illinois State Academy of Science
TMMPRA	Tropenmedizin und Parasitologie
TNWSR	Transactions of the Northeast Section, The Wildlife Society
TRCIA	Transactions Royal Canadian Institute
TRSTA	Transactions of the Royal Society of Tropical Medicine and Hygiene
VETRA	Veterinary Record
VIWIA	Virginia Wildlife
VPARD	Veterinary Parasitology
VTPHA	Veterinary Pathology
VTYMA	Veterinary Medicine and Small Animal Clinician
WDABB	Bulletin of the Wildlife Disease Association
WGFBA	Wyoming Game and Fish Commission Bulletin
WIDIA	Wildlife Disease
WLMOA	Wildlife Monographs
WLSBA	Wildlife Society Bulletin
WMBAA	Wildlife Management Bulletin
WSCBA	Wisconsin Conservation Bulletin

XAGCA U S D A Circular

XENOB Xenobiotica

ZEVMA Zentralblatt fuer Veterinaermedizin

ZOANA Zoologischer Anzeiger

ZOGAA Zoologische Garten

ZOOAA Zoologica Africana

ZOPOA Zoologica Poloniae

ZTMPA Zeitschrift fuer Tropenmedizin und Parasitologie

LIST OF PUBLISHERS - CHAPTER TEN

acpr	Academic Press	New York	nyny
ccth	Charles C. Thomas	Springfield, IL	spil
faog	Food & Agriculture Organization of U. N.	Rome, Italy	roit
hein	Heinemann	London, England	loen
isup	Iowa State University	Ames, IO	amia
lefe	Lea and Febiger	Philadelphia, PA	phpa
plpr	Plenum Press	New York	nyny
tccp	Taylor County Printing Co.	Reynolds, GA	rege
wbsc	W. B. Saunders Company	Philadelphia, PA	phpa