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NSN 7540-01-280-5500

Texas A&M Research

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Box 3578 College Station, TX 77843 409-862-4594 Fax: 409-845-7143

FAX TRANSMISSION COVER SHEET

Date: August 23, 1995

To: Carmen Calvert - AFOSR/PKA

Fax: 202-404-7951

Re: Final Technical Report - Grant 90-NL-0244

Sender: Mari Rhinehart

YOU SHOULD RECEIVE 4 PAGE(S), INCLUDING THIS COVER SHEET. IF YOU DO NOT RECEIVE ALL THE PAGES, PLEASE CALL 409-862-4594.

The following is the Final Technical Report for Grant 90-NL-0244 for your reference. If you have any questions, please call 409-862-4594.

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Department of Biology

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Dr. Genevieve Haddad Program Manager Directorate of Life and Environmental Sciences Department of the Air Force Air Force Office of Scientific Research Bolling Air Force Base, DC 20332-6448

Dear Dr. Haddad, CA

July 12, 1995

I am writing the final report on Air Force Grant 90-NL-0244. This grant has been renewed under a new number, and therefore the original grant is being terminated.

I am very happy to say that we have been very productive with the funds your office has provided. In all we have published or are publishing 18 full-length papers listed below:

1) **Cassone, V.M.** (1991) Melatonin and SCN function. In: <u>Suprachiasmatic Nucleus: The Mind's Clock</u>. DC Klein, RY Moore, SM Reppert (eds) Oxford University Press, NY, pp. 309-323.

2) **Cassone, V.M.**, D.S. Brooks, (1991) The sites of melatonin action in the house sparrow brain. <u>J. Exp. Zool.</u> 260: 302-309

3) **Cassone, V.M.** (1992) The pineal gland influences rat circadian activity rhythms in constant light <u>J. Biol. Rhythms</u> 7: 27-40

4) Brooks, D.S., V.M. Cassone (1992) Daily and circadian regulation of 2[¹²⁵I]iodomelatonin binding in the chick brain. <u>Endocrinology</u> 131: 1297-1304

5) **Cassone, V.M.**, D.S. Brooks, D.B. Hodges, T.A. Kelm, J. Lu, W.S. Warren (1992) Integration of circadian and visual function in mammals and birds: brain imaging and the role of melatonin in biological clock regulation. In: <u>Advances in Metabolic Mapping Techniques for Brain Imaging of Behavioral and Learning Functions.</u> F. Gonzalez-Lima, T. Finkenstaedt and H. Scheich (eds) Kluwer Academic Publishers, Dordrecht/Boston/London, pp. 299-318.

6) **Cassone, V.M.**, W.S. Warren, D.S. Brooks and J. Lu (1993) Melatonin, the pineal gland and circadian rhythms. <u>J. Biol. Rhythms</u> 8, Suppl.: S73-S81

7) Warren, W.S., D.B. Hodges, V.M. Cassone (1993) Pinealectomized rats entrain and phase-shift to melatonin injection in a dose-dependent manner. J. Biol. Rhythms 8: 233-245

8) Lu, J. and V.M. Cassone (1993) Pineal regulation of circadian



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rhythms of 2-deoxy[¹⁴C]glucose uptake and 2[¹²⁵I]iodomelatonin binding in the visual system of the house sparrow, <u>Passer</u> <u>domesticus</u>. J. Comp. Physiol. A 173: 765-774

9) Lu, J., and V.M. Cassone (1993) Daily melatonin administration synchronizes circadian patterns of brain metabolism and behavior in pinealectomized house sparrows, <u>Passer domesticus</u>. J. Comp. <u>Physiol. A</u> 173: 775-782

10) Warren, W.S., T.H. Champney and V.M. Cassone (1994) The suprachiasmatic nucleus controls circadian rhythms of heart-rate via the sympathetic nervous system. <u>Physiol. Behav.</u> 55: 1091-1099

11) **Cassone, V.M.**, and J. Lu (1994) The pineal gland and avian circadian organization: the neuroendocrine loop. <u>Adv. Pineal Res.</u> 8: 31-40

12) Warren, W.S., and V.M. Cassone (1995) The pineal gland, photoreception and coupling of behavioral, metabolic and cardiovascular circadian outputs. J. Biol. Rhythms 10: 64-79

13) **V.M. Cassone**, D.S. Brooks, and T.A. Kelm (1995) Comparative distribution of 2[¹²⁵I]iodomelatonin binding in the avian brain: outgroup analysis with turtles. <u>Brain Behav. Evol.</u> 45: 241-256

14) Lu, J., M.J. Zoran and V.M. Cassone (1995) Daily and circadian variation in the chick electroretinogram: Effects of melatonin. J. Comp. Physiol. 176:

15) Brooks, D.S. and V.M. Cassone (in press) The distribution of 2-[¹²⁵I]iodomelatonin binding during the development of the chick visual system <u>Dev. Brain Res.</u>

16) Reppert, S.M., D.R. Weaver, V.M. Cassone, C. Godson, A Roca and L.F. Kolakowski Jr. (in press) Melatonin receptors are for the birds: Molecular analysis of two receptor subtypes differentially expressed in chick brain. <u>Neuron</u>

17) Lu, J., H. Wu, and V.M. Cassone (in preparation) A mathematical model of the biological clock of birds <u>J. Biol. Rhythms</u>

18) Brooks, D.S., and V.M. Cassone (in preparation) Role of the pineal gland and visual suprachiasmatic nucleus in the circadian regulation of 2-[¹²⁵I]iodomelatonin binding in the chick brain.

In addition, with Air Force funding, we have directly funded three graduate students through their Ph. D. degrees. These students are listed below:

1) Dr. David S. Brooks is an Assistant Professor of Biology at LeTourneau University in Longview, TX.

2) Dr. Jun Lu is a post-doctoral fellow with Dr. Michael Menaker at the NSF Center for Biological Timing at the University of Virginia.

3) Dr. Wade S. Warren is just starting a post-doctoral fellowship with Dr. Timothy Bartness at Georgia State University.

We have also supervised 6 Master's level graduate students who have gone on to do great things:

1) Mrs. Alaana Tynes is an instructor of human physiology at Blinn Junior College.

2) Mrs. Teresa Kelm is a high school teacher at Waco High School.

3) Miss Dawn Parker is studying for a Ph.D. degree in Scientific Education at Texas A&M University.

4) Mr. Donald B. Hodges is a research assistant with Pfizer Pharmaceuticals.

5) Ms. Haydee Vercesi is a research assistant at SUNY at Stony Brook.

6) Mrs. Melissa G. Rucker is a research assistant in my laboratory here at Texas A&M.

Finally, we are currently supervising 2 Ph.D. level graduate students, who are doing great things.

1) Mr. Arjun Natesan is in his second year.

2) Mr. Hong Tao Min is in his first year.

Research on the original proposal continues. We are still working on the in vivo microdialysis research and should have a manuscript ready by the end of the year. We are also making great strides on the molecular biology of the melatonin receptor. As you can see from the list of publications, we have, in collaboration with Steve Reppert and others, cloned two melatonin receptors in chicks. One of the receptors is specific for glia and is expressed rhythmically in the pineal gland (but is not translated there!!). In addition, in collaboration with Dave Klein, we are working on the chick NAT molecule.

We have not forsaken the systems level physiology research you and I love so well. We are still working on the in vivo microdialysis, and Wade Warren has just finished a study of norepinephrine turnover in peripheral tissues of the rat. Rhythms of turnover are pervasive in the body, but have different phases. SCN lesion abolishes them!

Anyway, thank you for your continuing support. I hope and trust we can continue our productive relationship.

Sincerely Yours, Vincent M. Gassone, PhD